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Section 1. Biology

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Materials on population and habitats of Turkmen Kulan (onager *Equus hemionus,* Pallas) at Karakalpakstan Part of Usturt

Abstract: In the article there are given materials about modern spreading and the number of the Turkmen onager *Equus hemionus* dwelling in the karakalpak part of the Ustyurt Plateau. There are described the threads and given the recommendations on protection of this species by organizing the nature — protected territories.

Keywords: the Turkmen kulan, the Ustyurt Plateau, the Sarykamish Lake, the Red List of IUCN.

The vast territory of Karakalpakstan is rich with animal and plant wild world. This attracts the attention of neighbor countries and their researchers since earlier times. Karakalpakstan's Plateau of Ustyurt and the Dessert Kizilkum since earlier times has been the shortest caravan way connecting Central Asia with Europe, which put the beginning of trade — economic relationship between these two worlds. Since earlier times has been organized survey expeditions where many zoologists and naturalists took part. Later with interest they describe the animal and plant wild life of native land.

At the beginning of XIX century the famous researcher of wild nature E. A. Eversman [9] recorded plentiful population of wild horses, donkeys and sayga at the Plateau of Ustyurt.

Turkmen kulan (onager horse — *Equus hemionus* Pallas) since 1775 to XIX century has been wide spread at the steppes of Central Asia, Kazakhstan, West Siberia and Europe. At Uzbekistan *Equus hemionus* Pallas has been populated at the Plateau of Ustyurt till XX century, and according to the records of Ishadov [1] during 30s of XX century almost in all of these districts the species of kulan has been shot and entirely extincted. Kulan (onager (horse) — *Equus hemionus* Pallas) enters the Red list of IUCN, enters in appendix of CITES and has been registrated in the Red Book of Uzbekistan with the status of 0 (EW) as an extincted species of wild world of the country which has also sub species [3; 12; 13].

Kulan habituates at plateaus, at desserts and at half-desserts of Ustyurt. At summer time kulan makes small herds mostly near to watersheds but during the wintertime they gathered in big herds wandering over the dessert. In Turkmenistan during July-August drive horses to prairies. Kulans give birth a child mostly in May-June. They eat mostly cereals. In autumn they eat wormwood and solyanka. In winter they feed themselves with wormwood, cereals, leaves, brunches bushes and half-bushes of solsola.

Zoologists of Karakalpakstan anti-plague station constantly run surveys on the territory of Ustyurt and Kizilkum. Since 1954 up now the scientific researchers of Karakalpakstan Academy of Sciences (Affiliation of Uzbekistan AS) and also Karakalpakstan State University each year organize field surveys on animal and plant wild world. Has been prepared questionnaires especially for cattle farmers and separately for members of various expeditions, also for local aged people who are familiarized to these areas since childhood and know well each animal and plant of this part of wild world. All these data concerning to kulan (onager (horse) — *Equus hemionus* Pallas) has been chronologically analyzed as a monitoring for long years survey.

The results of oral and written records have been published during the last years. And the results of our own monitoring survey concerning to kulan (onager (horse) -*Equus hemionus* Pallas) held since 1980 up now at Ustyurt has been compiled as following: 1982–1983 at the area of the lake Sarikamish located on the territory of Kaplankir prairies (Turkmenistan). Kulans habitat these places up to 1930 and have been counted about 100 kulans. At present at Sarikamish registrated about 300–400 kulans [2; 4; 10].

Before 1980 kulan was very rare in the South and Central pert of Ustyurt (Karakalpakstan part).

One of the shepherds, 80 years old Besbay, knowing Ustyurt since childhood in 1986 told that kulans often appeared at the area of the lake to drink water with the horse-herds of domestic horses.

Another shepherd by name Izgurgan in 1986 reported that in May, at the district of Well Baychagir 25–30 km South-West from Barsa-Kelmes they sow two females of kulan's, these female kulans disturb Izgurgan's horses and one of the female kulans was shot by Izgurgan. In May of 1986 on the territory of Shahpahty (20 km to South-West) for the first time in Karakalpakstan, at Ustyurt we registrate only one male kulan. In Autumn of 1986, (8–10 of October) on the territory of Uzunkuyu Well, at the district of "Kulan Takir" 30–40 km South-West from the Lake Sarikamish, we registrated two kulans (one male, one female).

Moreover, as some shepherds and horse-farmers from Kunya-Urgench district, from Turkmenistan (Tarshause district) told (their names are Duzelbay, Baubek, Temirbay) that in spring, summer and

autumn of 1985, at the Well Silekeyli, Actay-Oy, Koskuduk, kulans often came to drink water with a herd of horses consist of 8–12 members and went back together. In September of 2009, again on the territory of Uzunkuyu Well, at the district "Kulan Takir", we registrated 4 kulans (one female and three males). Frightened kulans seeing us from the far ran away to the direction of the Lake Sarikamish.

On the territory of Uzbekistan a group of local researchers discovered kulans at the South -West part of Karakalpakstan Ustyurt, which is hard reaching and remote area. Here runs the border belt of Karakalpakstan with Turkmenistan and kulans though the frontier guard could easily moved from Turkmenistan and populate on the territory of Uzbekistan [5]. On 25th of May, 2012 this group of researchers discovered two young females of kulan habituating in saksaul bushes near to the north part of the lake. Also they discovered the excrements of kulans here and there at the North part of Assake-Audan, at the South part of salt-mashes Shordja bordering with the Lake Sarikamuish from the South. Plentiful of kulan's tracks and traces, excrements have been revealed by the researchers at the Southwest coastal part of Sarikamish and at the area of hill foots located between the lake and the hills. At the foot of the hill has been found a lower jaw with teeth and shoulder blade of a kulan. Karakalpak fishermen confirm that kulans really habituate there because they often sow a herd of kulan consists of 20 members.

The same researcher group in 2014, on June 2 reported about a group of kulan with nine kulans at the Southwest of upper hill area near to Turkmenistan border. According to their data, after counting the fresh traces of kulan, approximate number of kulan populated at the Uzbekistan part of Ustyurt during spring-summer period makes 42–48 heads. It is possible that kulans migrated to the South part of Sarikamish to find a shelter from the cold dessert winds and hide behind the tall hills. Some fishermen confirmed that in winter when the water of the Lake Sarikamish turns into ice kulans and other animals moved from Turkmenistan to Uzbekistan and vice versa over the ice. In spring when fishermen started their job kulans moved to west and tosouth on the territory of Turkmenistan and only some kulans with small groups stay in Uzbekistan during spring-summer period [6]. The same group of researchers gives the approximate number of kulan population on the territory of Uzbekistan at the area of Sarikamish and Plateau of Ustyurt. It makes about 50–100 kulans. According to E. Rustamova and co [7] data in 1989 on April 26, at the South Ustyurt, at the east Well of Usunkui (Uzbekistan) has been revealed a group of kulan consists of 46 members and also has been revealed traces and excrement of kulan at the north coast of the LLake Sarikamish. According to the data of Turkmen researchers at present the number of kulans habituating at the area of Sarikamish is about 100–130 heads of which 70% is habituating in Kaplankir prairie.

Analyzing all above-mentioned data and also our records we can say that at present the number of all kulans of Sarikamish population habituating at Karakalpakstan part of Ustyurt is 70–100 heads. These figures concise with the data of N. Marmazinskiy and co [6].

We consider that kulan existence at Karakalpakstan part of South Ustyurt, especially at the area of the Lake Sarikamish is because this territory is near to Kaplankir prairie in Turkmenistan, from where kulan move to Uzbekistan recently. More over one of the reasons that kulan cross the border in winter and to move to South part of Sarikamish is to find a shelter from the cold winds behind the high hills, as the fishermen confirm that when in winter the lake water turns into ice kulan and other animals cross the border and move from Tukmenistan to Uzbekistan and vice versa over the ice surface [6]. The main menace for the mammals and also kulan populated in South and Central Ustyurt is poacher caused by fishermen, animal-farmers and wolves.

In 2009 appeared another trouble, connected with the water gates from the canals feeding the Lake Sarikamish for filling the man-made pond "Altin Asir" [8]. This could make the water of the lake extremely saline [11], which is the main water-drinking place for the wild animals habituating at South Ustyurt. Kulans from historical times are the main game for the local hunters who are skillful and know effective methods for catching kulans. The hunters know the time when kulans come to drink water with big groups and thus kulans were killed by hunters and entirely extincted. At present while hunting the poachers use different vehicles as motorcycles, cars and even flying transports. For protecting the life of kulan must be held constant monitoring on places of population, food security, enemies, food opponents and so on. It is necessary to organize prairies and reserves on the territory of Barsa-Kelmes, Agiin from the North, Shakhpakhti, Assake-Audan, Shordja at the central part, The Lake Sarikamish from the South-East and Shor Kazakhli from South-West.

References:

1. Ishadov N. Population and Contemporary Number of Hoofed Animals at South-West part of Kurkmenistan//Triology, – Novosobirsk, – 1972. – V. 1. – P. 417–419. (in Russian).
2. The Red Book of Turkmenistan. Invertebrates and Vertebrates Animals. – V.2. – Ashkhabad, – 2011. – 384 p. (in Russian).
3. The Red Book of Uzbekistan, – Vol. 2. Animals. – Tashkent, – 2009. – 215 p. (in Russian).
4. Kuznetsov V. I. Kulan's Returning. The Unique Creature of Wild World Steadily Takes Its Ecological Place//Turkmenistan. International journal. – No 1–2. – 2014. – P. 84–94. (in Russian).
5. Marmazinskaya N. V., Grintsina M. A., Mitropolskiy M. G. Fresh Figures on Rare Species of Mammals at the South Pert of Karakalpakstan Ustyurt and the North part of Sarikamish Area. (Uzbekistan)//Materials of Intern. Conference "Land Vertebrates of Arid ecosystems" – Tashkent, – 2012. – P. 204–210. (in Russian).
6. Marmazinskaya N. V., Grintsina M. A., Mitropolskiy M. G., Murzakhanov P., Wuderlix Y. Rare Hoofed of Central and South Ustyurt and Sarikamish Area: Mater. Rep. Science-Practical Conf. "Contemporary Problems for Preserving Rare, Extincting and Non-studied Animals of Uzbekistan". –Tashkent, – 2016. – P. 118–127. (in Russian).
7. Rustamov E. A., Kachinskiy p., Caparmuratov D. Kulan at the Edge of Extinction and Its Conservation in Turkmenistan//Contemporary Problems of Zoology, Ecology and Nature Protection. Mater. Reading and science conf. Devoted to Prof. A. g. Bannikova. – Moscow, – 2016. – P. 118–127. (in Russian).
8. Turkmen Lake of "Altin Asir". – Ashkhabad, – 2009. – 100 p. (in Russian).
9. Eversman E. Reise von Orenburg nach Buchara, begleitet von einem naturhistorischen Anhange und einer Vorrede von H. Lichtenchtein. – Berlin, – 1823. – 193 p.
10. Rustamov A., Rustamov E. Biodiversity conservation in Central Asia: On the example of Turkmenistan//NEF – Tokio, – 2007. – 204 p.

11. Ten A., Kashkarov R., Matekova G., Zholdasova I., Turaev M. New Important Bird Areas in Uzbekistan//Sandgrouse, – 34 (2), – 2012, – P. 137–147.
12. URL: http: www.iucnredlist.org
13. URL: http: www.cites.org

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Xylophage insects (*Insecta: Coleoptera; Hymenoptera; Isoptera*) — industrial wood vermin in Uzbekistan

Abstract: Researches have been first performed in 14 regions of Uzbekistan to identify xylophagous insects that damage industrial wood, timber, construction material, lumber and household items made of wood owned by individuals, organizations, strategic objects, cultural heritage objects, etc. The wood inhabited with wood borers was reported in 41.4% cases. To the most harmful and widespread 15 species of wood borers identified in Uzbekistan refer common furniture beetle *Anobium pertinax* L., black longhorn beetle *Hylotrupes bajulus* L., *Anacanthotermes turkestanicus* J. and *A. ahngerianus* J. termites and true bees (superfamily of Apoidea.) — antoforidies (Anthophoridae Family). The local spread of xylophagous insects is reported at the territory of the republic as well as the lack of large core inhabitants, except for termites of Anacanthotermes genus. The main reason of industrial wood and other material attack is application of wood of high humidity and its contamination with wood-staining fungi; the wood and construction material not debarked; lack of fungicidal treatment of the wood to prevent mold damage and fungosity and lack of insecticide treatment to prevent insect attack. The present work is performed under the financial grant of the State Scientific and Technical Programmes (GNTP) Ф5-ФА-0–14830 "Investigation of population ecology and functioning of the range of xylophagous insects and their adaptive mechanisms" (2012–2016).

Keywords: beetles, horntails, anthophoridae, termites, industrial wood, Uzbekistan.

1. Introduction:

Improving the life, human beings tend to live in the environment using items of natural and animal origin. These items are often subject to attack of various insects from the nature resulting in their damage. Over 1000 cases of wood and wooden structure damage are reported in objects of cultural heritage and residential houses of the private sector in the city of Tashkent, Andijan, Bukhara, Jizzakh, Kashkadarya, Navoi, Namangan, Samarkand, Surkhandarya, Syrdarya, Tashkent, Fergana, Khorezm regions of Uzbekistan and the Republic of Karakalpakstan (walls, columns, floors, flooring, windows, doors, furniture, musical instruments, etc.) attacked by termites [7; 8; 9; 22]. The challenge to protect wooden structures and items from infestation by xylophagous insects that results in the emergency condition of houses, buildings and museum facilities constructed demanded the urgent address.

It is known that symbiote fungus and microorganisms found in gastrointestinal tract thereof commit to the deleterious activity of insects that feed on wood cellulose contribute. The extent of the wood damage is even more enhanced by the combined infestation with fungi and insects [18].

However, the measures to prevent attack of true powderpost beetles still remains not only time consuming, but often less-effective. The reason is the latent life habit of the pest larvae in in the wood, duration of the larval stage and uneven development of larvae, yet, within a single generation, nocturnalism of most imago species and high reproductive pattern thereof, food availability and adequacy which, in combination, cause difficulties to perform preventive measures and extermination of insects. Moreover, the latent life habit of larvae, and sometimes that of imago, in wood contributes to almost minimization of the number and category of their enemies and parasites.

A range of major publications [2; 3], aim to highlight most issues associated with fauna, taxonomy, biology, physiology and ecology of some groups of insects of Uzbekistan and neighboring areas. Of the range of xylophagous insects relatively thorough investigations of termites have been performed [7; 8; 9; 22]. Nevertheless, the termite investigations have been primarily focused in the Republic of Karakalpakstan and Khorezm region. The information on other xylophagous insects of Uzbekistan and some other details of their ecology were fragmentary [2].

The **purpose** of this work was to determine the species composition of xylophagous insects — the pests that damage the industrial wood in Uzbekistan, isolation of the most harmful and mass species among them and elaboration of the strategи to manage the xylophagous insect populations.

This workhas been performed under the financial grant of the Uzbek Academy of Sciences F5-FA-0–14830 "Investigation of

population ecology and functioning of the range of xylophagous insects and their adaptive mechanisms" (2012–2016).

2. Materials and Metods.

Routing surveys are conducted for all wooden structures, items and objects from timber in premises and buildings of private sector, administrative, historical and strategic facilities in 14 regions of Uzbekistan (Tashkent, Andijan, Bukhara, Jizzakh, Kashkadarya, Navoi, Namangan, Samarkand, Surkhandarya, Syr-Darya, Tashkent, Fergana, Khorezm, Republic of Karakalpakstan). The data on industrial wood infestation and insect collection was compiled through route surveys from March to October 2012–2016, the period of active insect behavior.

The surveys in premises were started from the inspection of wooden windows and windowsills since most insects are light requiring. Moreover, the floor near the windows, baseboards, flooring under the furniture, shelves, cabinets, and so forth have been inspected followed by investigation of individual wood items. The survey was performed in the whole building including the attic space and a basement.

The opinion on the damage of timber or wooden items by xylophagous insects was made based on a range of external signs, of which, the following have been identified if they were found on the surface of infected objects or under:

– spill (wormhole dust) — by-product of insect larvae,

– holes — refer to exit holes of beetles and other insects,

– clay molding — infestation of an object with termites.

To revel the living larvae of xylophagous insects, the infected object was opened though this was not always available and acceptable especially regarding the cultural heritage facilities. Anything found during the survey (live insects, larvae, case-warm or pupae or their remaining skin) was collected into tubes and containers and labeled.

The specimens were tested for the precise analysis and identification of insects in the Laboratory of Entomology and Mycology of the Institute of Plant and Animal Genofond of the Uzbek Academy of Sciences.

The study object were the xylophagous insects (beetles, antoforides, horntails, termites), wood, timber and items from different tree species collected in various anthropogenic biocenoses of Uzbekistan.

Field surveys and laboratory tests were performed as widely accepted in entomology and ecology [20, 21] during works. The works included identification of all damages and pattern thereof, the results were photographed using the digital camera and recorded in the "Damaged wood sample card" developed by us using projects made by I. N. Toskina and I. P. Provorova [21].

Along with collection of xylophagous insects, peculiarities of their ecological population were reported, namely, the ecological condition of the habitat (climate, the room climate — temperature, light, heating, windy, humidity, presence of fungal infections, etc..) were marked as well as its location, terrain, geographical structure, soil and vegetation, fauna, water sources availability, organics, etc.

The xylophagous insects have been mainly identified by the imago, by th sample of wood damaged by them as per B. M. Mamaev, L. N. Medvedev, F. N. Pravdin [16], S. S. Izhevskiy, et al [6], I. N. Toskins, I. P. Provorova [21] and others.

The termite species of *Anacanthotermes* genus were investigated by molecular and genetic methods at the Scientific Research Center for Physical and Chmical Biology named after A. N. Belozersky at the M. V. Lomonosov Moscow State University (Russia) [17].

3. Results and Discussion

In the course of routing surveys we have revealed that the high extend of damage is caused to wooden structures of buildings and facilities in rural areas of the country, where the local population is not fully aware of pests and preventive measures to protect the wood against infestation by xylophagous insects. Moreover, the people willingly tend to use the wood damaged by these insects [19]. Consequently, the measures to treat facilities against fungi and woodborers, restoration of wooden buildings, structures and utensils, require a huge amount of funds. Losses associated with the damage of cultural heritage objects with xylophagous insects of the republic (Khiva, Bukhara, Navoi, Samarkand, Termez and others) cannot be recovered at all.

More than 200 species of insects are reported in the CIS countries only that can damage various wooden materials and items. Not all of them are equally injurious, indeed; approximately, 80 species of insects often behave harmfully and cause the considerable damage to wood. Most of these insects refer to two largest orders including about 50 species of Coleoptera beetle and over 20 species of Lepidoptera butterfly. The remaining pool of few species refer to pests as follow: Isoptera termites, *Psocoptera* louse, Hymenoptera and Thysanura [4].

In the early XX century, G. G. Yakobson [23; 24] described 4 species of termites of the *Anacanthotermes* genus found at the territory of the Central Asian republics, of them, 2 species, namely, *A. turkestanicus* and *A. ahngerianus* are reported to habitat in Uzbekistan known for high level of morphological similarities.

We performed molecular and genetic surveys to reveal that *A. ahngerianus* prevails in the south-west and west of Uzbekistan; *A. turkestanicus* is found in remaining parts of republic [17].

Apart from termites that destroy the construction timber, lumber and household items made of wood, in 2012, we proceeded to investigation of other xylophagous insects — industrial wood pests in Uzbekistan [10; 11; 12; 13; 14].

The survey reported on 41.4% cases of infestation with xylophagous insects of wooden structural elements and household items made of wood of private owners, organizations, strategic objects of cultural heritage; timber, building materials, and lumber. At the same time, the spread of insects was reported as local and there was no mass and abundant population of insects revealed. However, this colonization does not apply to termites of Anacanthotermes Genus.

Termite colonization in the territory of the republic was reported both in natural and urban ecosystems. They are observed in all regions of Uzbekistan where private housing and cultural heritage objects are reported to be seriously destroyed by termite population (Table).

The most extensive and intensive settlement of the *A. turkestanicus* Turkestan termite is typical for the Central and Southern regions of the country, the large Transcaspian *A. ahngerianus* termite prevails in the North-West. By the survey results, in some habitats of *A. turkestanicus* in Uzbekistan, the population of *A. ahngerianus* is reported to evidence on no distance of the area of species to be considered. This is again proved by the results of the study performed by a group of authors [5; 15] on overlapping areas of *A. turkestanicus* and *A. ahngerianus* population in ecosystems of Uzbekistan [1].

By the outcome of works to identify xylophagous insects that destroy the industrial wood, items and objects of wood in Uzbekistan, 15 species of wood borers were identified referring to 3 orders 7 families, and 13 species of them, apart from termites, were fist revealed in Uzbekistan:

– Hard-wing beetles (Coleoptera Order) – 9 species: death-watch beetles (Anobiidae Family) – 5 species: houseworm *Anobium pertinax* L., woodworm *Anobium punctatum* D., beetle *Priobium carpini* H., red-legged *Anobium rufipes* L. and velutinate *Oligomerus brunneus* O.; long-horn beetles (Cerambycidae Family) – 2 species: house longicorn

beetle *Hylotrupes bajulus* L., *Saperda octopunctata* (Scop.); bark beetles (Scolytidae Family) – 1 specie: eight-dentated bark beetle *Ips typographies* L. and true powderpost beetles (Lyctidae Family) – 1 specie;

– Isoptera: termites (Hodotermitidae Family) – 2 species: Turkestan termite *Anacanthotermes turkestanicus* J. and the large Trans-Caspian termite *A. ahngerianus* J.

– Hymenoptera Order: horntails (Siricidae Family) – 2 species and true bee (Apoidea Superfamily), of them, Anthophoridae – 2 species.

Table 1. – Spread of *A. turkestanicus* and *A. ahngerianus* termites by Uzbekistan regions (2003–2013, termitarium investigated by *n*-25)

Regions	Ecosystems			
	natural		urbanized	
	A. turkestanicus	***A. ahngerianus***	***A. turkestanicus***	***A. ahngerianus***
North-Western: Khorezm region, Republic of Karakalpakstan	+	+++	+	+++
Central: Samarkand, Bukhara, Navoi regions	+++	+	+++	++
Eastern: Andijan, Ferghana, Namangan regions	+	–	++	–
North-Eastern: Tashkent, Syrdarya, Jizzakh regions	+	–	++	–
Southern: Surkhandarya, Kashkadarya regions	+++	–	+++	–

Most injurious and mass species of wood borers revealed in Uzbekistan are the common furniture beetle *Anobium pertinax* L., house longicorn beetle *Hylotrupes bajulus* L., *Anacanthotermes turkestanicus* J. and large Trans-Caspian termite *A. ahngerianus* J. and Anthophoridae Family species of Apoidea Superfamily of true bee.

Conifers like pine, spruce, larch, fir and cedar are widely used in global construction. Most often, bearing wooden structures are made of them. The wood is used to arrange walls and partitions, roofing and ceilings, to manufacture moldings and millwork. This wood waste product is also effectively used, namely: sawdust and chips are used to manufacture items along with chipboards and xylite items, using various organic adhesives, pressed boards, planks, etc.

In Uzbekistan, wood of local poplar an willow is often used for building construction. These woods differ in the content of moisture in the wood, [19] and the population of termites and xylophagous insects that willingly settle in wood.

However, a comparative analysis performed to study the population of xylophagous insects showed that the most number of species identified to destroy houses made of mud, clay and straw and wood, industrial wood and utensils in the country is associated in view of ecology with the raw untreated wood of deciduous trees (poplar, willow).

Infestation of wood with termites can be easily and faster identified by formation of clay molds and galleries on the surface of wood or soil. Identification of xylophagous isects by outer signs is too more complicated and time-consuming. It is possible only when the wood is infested, and larvae actively develops in the wood, the wood-powder and exit holes appear on its surface, which commits to the considerable loss of the wood integrity and its prospective destruction. Accordingly, preventive measures against these pests also differ.

Therefore, it is required to reduce the moisture content of the wood prior to use, which can prevent damage of wood by wood-fungi; to peel and highly clean the surface of the wood and construction materials from irregularities; to pre-treat the wood with preservatives and insecticides to avoid fungi and insects.

4. Conclusion and Recommendations

Researches have been first performed in 14 regions of Uzbekistan to identify xylophagous insects that damage industrial wood, timber, construction material, lumber and household items made of wood owned by individuals, organizations, strategic objects, cultural heritage objects, etc. The wood inhabited with woodborers was reported in 41.4% cases. Most injurious and mass species out of 15 species of woodborers in Uzbekistan are common furniture beetle *Anobium pertinax* L., house longicorn beetle *Hylotrupes bajulus* L., Turkestan *Anacanthotermes turkestanicus* J. and the large Trans-Caspian termite *A. ahngerianus* J. and true bee species (Apoidea Superfamily) — Anthophoridae Family species.

The local spread of xylophagous insects is reported at the territory of the republic as well as the lack of large core inhabitants, except for termites of Anacanthotermes genus. The main reason of industrial wood and other material attack is application of wood of high humidity and its contamination with wood-staining fungi; the wood and construction material not debarked; lack of fungicidal treatment of the wood to prevent mold damage and fungosity and lack of insecticide treatment to prevent insect attack.

References:

1. Abdullaev I. I., Khamraev A.Sh., Lebedeva N. I., – 2015. Anacanthotermes termite population ecology, Jacobson, – 1904. International conference information package "Environment protection and eco-biological education", Elabuga town, – November 25–26, – 2015, Russian Federation, Republic of Tatarstan, Elabuga: – 176-183.
2. Azimov D. A., Bekuzin A. A., Davletshina A. G., et al, – 1993. Insects of Uzbekistan. – Tashkent: Fan, – 1-340.
3. Azimov A. A., Kreuzberg A. – 2005. Necessity to strengthen meaures to supply cadaster funa information for Uzbekistan, Ekologicheskiy vestnik (Ecological bulletin), – Tashkent, – No 1. – 8-12.
4. Akulov E. N. – 2009. Phytosanitary condition of timber in Krasnoyarsk Krai, News-Bulletin (Izvestia) of the Saint-Petersburg State Forest Technical University. – Saint-Petersburg, – No 187. – 3-10.
5. Belyaeva N. V. Natural hybridization and experimental crossbreeding of termites of Anacanthotermes Genus, Jacobson**.** Works of the entomology sector of the research laboratory on elaboration of measures to prevent biological damage. – M. – 1974. – No. 5. – 74–83.
6. Izhevsky S. S., Nikitsky N. B., Volkov O. G., et al, – 2005. Illustrated Guide on xylophagous beetles – wood and forest pests of Russian. – Tula: Grif and Co, – 1-220.
7. Khamraev A.Sh., Lebedeva N. I., Abdullaev I. I. et all. – 2006. Biology, ecology and control of the Turkestan termite Anacanthotermes turkestanicus, infesting structures of historical importance in Uzbekistan. XV Congress of the International Union for the study of social insects. Washington D. C., USA, – August – 2006. – 3 p.

8. Khamraev A. S., Lebedeva N. I., Zhuginisov T. I. et all. – 2007. Food preferences of the turkestan termite Anacanthotermes turkestanicus (Isoptera: Hodotermitidae). USA, Sociobiology, – Vol. 50, – No. 2. – 469–478.
9. Khamraev A.Sh., Lebedeva N. I., Khokhlacheva V. E., et al, – 2008. Anacanthotermes termites – dangerous bio-destroyer of Uzbekistan facilities and elaboration of preventive methods and actions to control their population. (Collected works) Use of best practices to protect plants against pests", – Tashkent: TALQIN, – 102–114.
10. Khamraev A.Sh., Lebedeva N. I., Mirzaeva G. S., et al, – 2013. Biological and ecological features of common beetle (Anobium pertinax L.). Information bulletin of the Karakalpak State University named after Berdakh, Nukus, – No 3. – 143–147.
11. Khamraev A.Sh., Lebedeva N. I., Mirzaeva G. S., et al, – 2015. Wood as the habitat for borers. Reports of the AS of RUz, – No 2. – 93-97.
12. Lebedeva N. I., Khamraev A.Sh. – 2014. Common furniture beetle (Anobium pertinax L.) – enemy of wooden structures. Materials of the applied science conference "Improvement of measures against termits within the country territory", – Tashkent, – April 11, – 2014. – P. 27–30.
13. Lebedeva N. I., Khamraev A.Sh., Akhmedova Z.Yu., 2014 a. Xylophagous insects – malicious infestants of wooden materials and historic monuments. Materials of the applied science conference "Improvement of measures against termits within the country territory", – Tashkent, – April 11, – 2014. – P. 21–27.
14. Lebedeva N. I., Khamraev A.Sh., Mirzaeva G. S., et al, – 2014 b. Xylophagous insects – pest to destroy wooden materials and historic monuments. Information bulletin of the Karakalpak State University named after Berdakh, Nukus, – 4 (25): 21–25.
15. Luppova A. N., – 1958. Termites of Turkmenistan. Research works of the Zoology and Parasitology Institute, Academy of Sciences of – Turkmen SSR, – T. 2. – 81–145.
16. Mamaev B. M., Medvedev L. N., Pravdin F. N., – 1976. Insect identifier in the European part of the USSR. – M.: Prosveshenie: – 103–187.
17. Mirzaeva G. S., Allaberdiev R.Kh., Khamraev A.Sh. et all. – 2012. Molecular genetic studies of termites Anacanthotermes kind in Central Asia. 3rd International Conference "Molecular phylogenetics MolPhy-3", M. V. Lomonosov Moscow State University. – Moscow, – July 31 – August 4, – 2012 – M.: – 127.
18. Mozolevskaya E. G., Selikhovkin A. V., Izhevsky S. S., et al, – 2010. Forest Entomology. A textbook for university students. – M.: Akademiya, – 1-416.
19. Nurzhanov F. A., Lebedeva N. I., Nurzhanov A. A. – 2013. Determination of wood resistant to xylophagous insect damage and reasons of their stability. Biology – science of XXI century. – 17 International Pushin School of young scholars, SPb, thesis – M.: – 549–550.
20. Pearce M. J. – 2000. Termites. Biology, ecology and control: – 1-115.
21. Toskina I. N., Provorova I. P., – 2007. Museum insects. (Biology. Infestation prevention. Measures). – M.: Partnership of scientific publications, KMK: – 58-67.
22. Ergashev N. E., Madatyan A. V., Lebedeva N. I., – 1996. Injurious activity of termites in residential buildings. Agriculture of Uzbekistan, – Tashkent, – No 2. – 42.
23. Yakobson G. G., – 1904. On Russian termites. Works of the Entomology Bureau of the Board of Scholars of the Main department for land management and agriculture. – M., – T. YIII, – No 4. – 3–54.
24. Yakobson G. G., – 1913. Termites, inhabitant, damage caused by termites and ways of liquidation Works of the Entomology Bureau of the Board of Scholars of the Main department for land management and agriculture. – M., – T. X, – No 2. – 3–76.

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Association of polymorphisms of ADIPOQ, APOA5 and APOC3 genes with menopausal metabolic syndrome in Uzbek population of women

Abstract: Menopausal metabolic syndrome (MMS) — is a set of neurovegetative, psychoemotional and exchange-endocrine disorders occurring with the onset of menopause and include rapid weight gain with the formation of abdominal obesity, insulin resistance and dyslipidemia and/or arterial hypertension.

Each of the key components of MS, such as obesity, dyslipidemia, hyperglycemia and high blood pressure, has genetic predisposition for which main candidate genes were identified. These candidate genes areADIPOQ, APOA5 and APOC3.

It should be noted that certain gene polymorphisms in combination with estrogen deficiency displaythemselves differently in different populations dependent on gender, age and ethnicity.

The aim of our study was to investigate the association of polymorphisms of ADIPOQ, APOA5 and APOC3 genes in the Uzbek population of women with menopausal metabolic syndrome.

Materials and methods 60 women were involved in the study, with surgical and physiological menopause with the menopausal metabolic syndrome diagnosis (MMS). Genotyping of polymorphisms of ADIPOQ, APOA5 and APOC3 genes performed by PCR-RFLP.

Conclusion: the results obtained in this study suggest that the genetic variants of adiponectin gene (ADIPOQ) and apolipoprotein apoA5 gene (APOA5) labeled as the +276 (G/T) and –1131T>C contribute to the determination of violations which at the final stage lead to the development of MMC. In particular, G allele of ADIPOQ gene (genotype G/G and G/T) and genotype C/C of ApoA5 gene are genetic markers of predisposition to the MMC in Uzbek population of women. It is possible to do stratification of menopausal women into risk groups with the use of these markers.Application of the genetic markers in molecular-genetic prediction of MMC have great advantage as far as the predisposition to the disease may be established in the absence of any clinical or biochemical symptoms, i. e. at a very early stages of preclinical development of pathology. This will facilitate in targeted preventive measures and improvement of the quality of life of these patients.

Keywords: metabolic syndrome, arterial hypertension, hyperinsulinemia, abdominal obesity.

Menopausal metabolic syndrome (MMS) — is a set of neurovegetative, psychoemotional and exchange-endocrine disorders occurring with the onset of menopause and include rapid weight gain with the formation of abdominal obesity, insulin resistance and dyslipidemia and/or arterial hypertension.

Based on a detailed analysis of the work on the impact of menopause on insulin sensitivity, lipid and carbohydrate metabolism, distribution of adipose tissue and hemostasis system, as well as data on the effect of hormone therapy on these parameters in women, it is proposed to allocate the MMS as a complex of pathogenic risk factors of cardiovascular diseases, and ischemic heart disease in the first place, which is based on estrogen deficiency and insulin resistance.

Until now, the causes of MS in postmenopausal women, where complex interaction of genetic and environmental (in this case estrogen deficiency) factors plays a big role are not precisely known. In recent years, researchers started to pay more attention to the study of molecular-genetic factors of MS, to the scanning for susceptibility genes and polymorphisms and to the analysis of their association with various components of the syndrome. The role of genetic factors in the development of MS confirmed by some ethnic peculiarities of predisposition to MS. There are some reports about the association of MS with polymorphisms of several genes which products control adipogenesis, inflammation, carbohydrate and lipid metabolism. It is known that genes may influence the development of MS in various ways. Each of the key components of MS such as obesity, dyslipidemia, hyperglycemia and high blood pressure has a genetic predisposition and the main candidate genes has already been identified. This predisposition may cause or accelerate the development of MS. The main candidate genes are ADIPOQ, APOA5 and APOC3.

The ADIPOQ is one of the key genes which plays an important role in the development of metabolic syndrome. This gene composes of 3 exons and 2 introns, locates in the 3q27 locus of 3rd chromosome and expresses in the adipose tissue [1; 2]. Its product, the hormone adiponectin, consists of 247 amino acids [3], has anti-inflammatory and anti-sclerotic effect, increases sensitivity to insulin, regulates β-oxidation of fatty acids and maintains the glucose level in skeletal muscles and liver [4].

Gene APOA5, which encoding a protein of human apoA5, is localized in chromosome 11 and is located in a cluster of apolipoproteins apoA1/apoS3/apoA4/apoA5 and has 4 exons. APOA5 polymorphism associates with the level of triglycerides [5].

Apolipoprotein C-3 is another important apolipoprotein. Apolipoprotein C-3 is one of the basic components of triglyceride-rich lipoproteins (chylomicron and very low density lipoproteins), and is a part of high-density lipoproteins. It contains 79 amino acid residues and has a molecular weight of 8764 kDa. The apolipoprotein C-3 gene (*APOC-3*) is localized in chromosome 11q23.3 and in the gene cluster *APOA-1* and *APOA-4* within the range of 15 kb. It is expresses mainly in the liver cells [6].

It should be noted that the polymorphisms of certain genes in combination with the estrogen deficiency reveal themselves differently in different populations dependent on gender, age and ethnicity of their carriers. This indicates that the results obtained in one ethnic group should be carefully compared with the other populations.

The aim of our study was to investigate the association of polymorphisms of ADIPOQ, APOA5 and APOC3 genes in the Uzbek population of women with menopausal metabolic syndrome.

Materials and methods

In the study took part 60 women with surgical and physiological menopause with the diagnosis menopausal metabolic syndrome (MMS). In the control group there were randomly chosen 31 almost healthy women of menopausal period without any signs of MS. The age, gender and ethnical background were the same for experimental and control groups.

MMS diagnosis was confirmed based on the criteria of the International Diabetes Federation (2005).

All patients gave informed consent for this study. The research was carried out according to ethical standards of the National Ethics Committee of Uzbekistan, developed in accordance with the Helsinki Declaration of the World Medical Association's "Ethical Principles for medical research involving human subjects", with amendments (2013).

Genomic DNA was isolated from peripheral blood lymphocytes by standard protocol using a kit — Diatom™ DNA Prep 200 (production of "ISOGEN laboratory"). The action of this kit is based on the use of guanidine thiocyanate lysis agent that is intended to disrupt the cells, solubilization of cell debris and denaturation of cellular nucleases. In the presence of lysis agent DNA was sorbed on the NucleoS™ (sorbent), then washed of salts and proteins with an ethanol solution. DNA, eluted from the Extra-Genome™ sorbent was directly used for further analysis.

Genotyping of polymorphisms of ADIPOQ, APOA5 and APOC3 genes performed by PCR-RFLP.

At the first stage amplification of gene fragments was performed by PCR GeneAmp 9700 thermocycler (Applied Biosystems) with the use of flanking primers (Table 1). Each mixture for PCR reaction (total volume 15 μl) contained 5.2 μl of ddH_2O, 2.5 μl of 10xPCR buffer, 1.5 μl of 25 mM $MgCl_2$, 1.5 μl of 2.5 mM dNTP mixture (dATP, dCTP, dGTP, dTTP), 1.5 μl (10 pmol/μl) of each oligonucleotide primer, 0.3 μl (1.5 units.) of Taq-polymerase and 2 μl of DNA. PCR conditions are given in Table 2.

Table 1. – Oligonucleotide primers used in this work

Gene and Polymorphism	Primer	Sequence of primer
ADIPOQ+276 (G/T)	Pr_ADIPOQ_F	TCTCTCCATGGCTGACAGTG
	Pr_ADIPOQ_R	AGATGCAGCAAAGCCAAAGT
APOA5 – 1131T>C	Pr_APOA5_F	CAAGGTGACAGACAACTGGTGCAATGAT
	Pr_APOA5_R	CCCCAGGAACTGGAGCGAAATT
APOC3 – 455T>C	Pr_ APOC3_F	GGATTGAAACCCAGAGATGGAGGTG
	Pr_ APOC3_R	TTCACACTGGAATTTCAGGCC

Table 2. – Amplification mode

Gene and Polymorphism	Temperature	Time	Number of cycles
ADIPOQ+276 (G/T)	94 °C	5 min	1
	94 °C	30 sec	35
	57 °C	30 sec	
	72 °C	30 sec	
	72 °C	5 min	1
APOA5 –1131T>C	95 °C	5 min	1
	95 °C	30 sec	35
	64 °C	45 sec	
	72 °C	45 sec	
	72 °C	3 min	1
APOC3 – 455T>C	95 °C	5 min	1
	95 °C	30 sec	35
	60 °C	30 sec	
	72 °C	45 sec	
	72 °C	5 min	1

Products of PCR — gene fragments ADIPOQ, APOA5 iAPOC3 subjected to restriction via PctI, Tru9I and FokI endonucleases, respectively. The resulting restriction products were separated by gel electrophoresis in 8% polyacrylamide gel followed by staining with ethidium bromide and visualized in the transmitted ultraviolet light using a transilluminator «WiseDoc WGD-30» (DAIHAN, South Korea). Results of genotyping were analyzed on the basis of the differential pattern of bands on electrophoregram.

Statistical analysis

Assessment of genotype distribution frequency of Hardy-Weinberg equilibrium was performed using χ^2 test (Pearson's chi-squared test) (with $p > 0.05$). Assessment of the differences of frequency of alleles and genotypes of polymorphisms of PNPLA3 and AdipoQ genes between patients with MMS and control group was performed using Pearson's χ^2 test with the use of several models of inheritance. The differences accepted as significant at $p < 0.05$. To describe the relative risk of disease progression the odds ratio (OR) was used. OR = 1, considered as a lack of association, OR> 1 — as a positive association (increased risk of disease), OR <1 — as a negative association of the allele or genotype with the disease (reduced risk of disease). Calculations were performed using the "statistics Calculator for the studies" case-control" [7].

Results and discussion.

The frequency distribution of genotypes of ADIPOQ, APOA5 APOC3 genes in the control group was in line with the distribution of Hardy-Weinberg. Comparative analysis of the genotypes distribution frequency of polymorphism +276 (G/T) of AdipoQ gene showed statistically significant ($p = 0.002$ for the general model of inheritance and 0.0004 for the additive model of inheritance) increase in the occurrence of monozygotic ***G/G*** and heterozygous ***G/T*** in the experimental group compared with those in the control group (Fig. 1, tab. 3).

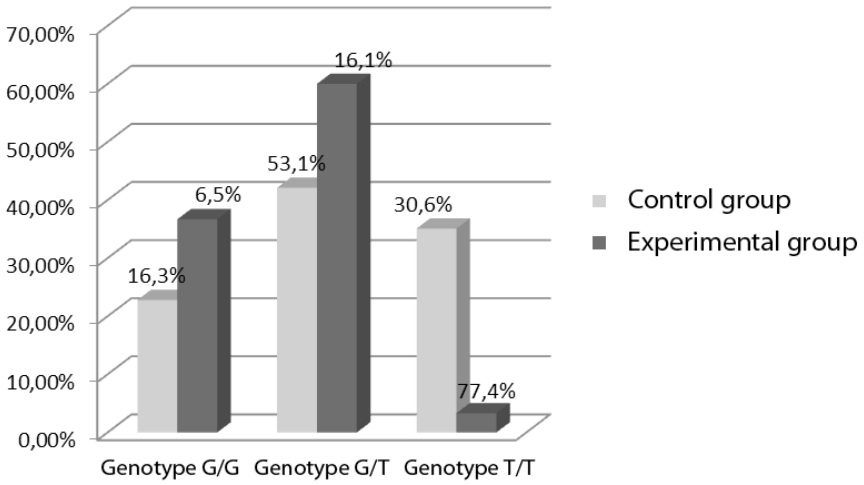

Figure 1. The distribution of genotype frequencies of the polymorphism +276 (G/T) of AdipoQ gene in the control and experimental groups

Table 3. – The results of the statistical analysis of genetic association of genotypes of AdipoQ gene with MMS

Model of inheritance	Genotypes	cases	Controls	χ^2	p	OR	
		n = 49	n = 31			value	95% CI
General inheritance model (chi-square test, df = 2)	*G/G*	16.3%	6.5%	16.70	0.0002	2.83	0.56-14.31
	G/T	53.1%	16.1%			5.88	1.94-17.83
	T/T	30.6%	77.4%			0.13	0.05-0.36
The additive model of inheritance (Cochran-Armitage test for linear trends, xi = [0, 1, 2], df = 1)	*G/G*	16.3%	6.5%	12.68	0.0004	2.83	0.56-14.31
	G/T	53.1%	16.1%			5.88	1.94-17.83
	T/T	30.6%	77.4%			0.13	0.05-0.36
The dominant model of inheritance (Chi-square test, df = 1)	*G/G+ G/T*	0.694	0.226	16.65	>0.0001	7.77	2.75-21.95
	T/T	0.306	0.774			0.13	0.05-0.36

The distribution of variant genotypes polymorphism –1131T>C ApoA5 gene analysis showed statistically significant (p = 0.004 for the general model of inheritance, p = 0.005 for the additive model of inheritance, p = 0.001 for the recessive model of inheritance) increase in the occurrence of monozygotic ***C/C*** patients (35.1%) compared with that in the control group (3.3%).

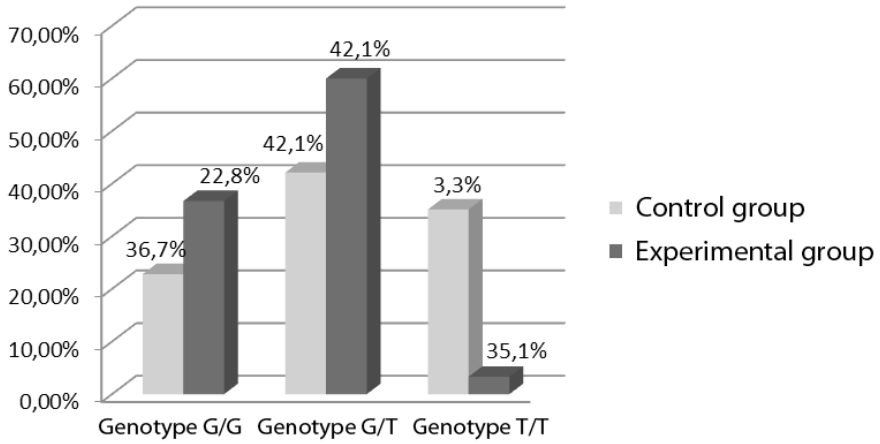

Figure 2. The distribution of genotype frequencies of the polymorphism –1131T>C of ApoA5 gene in the control and experimental groups

Table 4. – The results of the statistical analysis of genetic association of genotypes of ApoA5 gene with MMS

Model of inheritance	Genotypes	cases	Controls	χ^2	p	OR	
		n = 57	n = 30			value	95% CI
General inheritance model (chi-square test, df = 2)	*T/T*	22.8%	36.7%	10.88	0.004	0.51	0.19–1.34
	T/C	42.1%	60%			0.48	0.20–1.19
	C/C	35.1%	3.3%			15.68	1.99–123.78
The additive model of inheritance (Cochran-Armitage test for linear trends, xi = [0, 1, 2], df = 1)	*T/T*	22.8%	36.7%	7.92	0.005	0.51	0.19–1.34
	T/C	42.1%	60%			0.48	0.20–1.19
	C/C	35.1%	3.3%			15.68	1.99–123.78
The recessive model of inheritance (Chi-square test, df = 1)	*T/T+T/C*	0.649	0.967	10.82	0.001	0.06	0.01 –0.50
	C/C	0.351	0.033			15.68	1.99–123.78

Comparative analysis of the genotypes distribution frequency of polymorphism –455T> C of APOC3 gene showed no statistically significant differences between experimental and control groups (Table 5, Figure 3).

Thus, the results obtained in this study suggest that the genetic variants of adiponectin gene (ADIPOQ) and apolipoprotein apoA5 (APOA5) labeled as the +276 (G/T) and –1131T>C contribute to the determination of violations which at the final stage lead to the development of MMC. In particular, G allele of ADIPOQ gene (genotype G/G and G/T) and genotype C/C of ApoA5 gene are genetic markers of predisposition to the MMC in Uzbek population of women. It is possible to do stratification of menopausal women into risk groups with the use of these markers. Application of the genetic markers in molecular-genetic prediction of MMC have great advantage as far as the predisposition to the disease may be established in the absence of any clinical or biochemical symptoms, i. e. at a very early stages of preclinical development of pathology. This will facilitate in targeted preventive measures and improvement

of the quality of life of these patients which will reduce the risk of the development of cardiovascular disease. Preventive measures would include monitoring and correction of lipid profile, triglycerides for the prevention of atherosclerosis; abdominal obesity, insulin resistance, hypertension, BMI correction (body mass index) and timely hormone replacement therapy, taking into account the predisposition to carbohydrate disorders and obesity.

Therefore, it seems appropriate to include polymorphisms testing (+276 (G/T) of ADIPOQ gene and –1131T> of CAPOA5 gene) in a comprehensive program of MMS prevention in Uzbekistan.

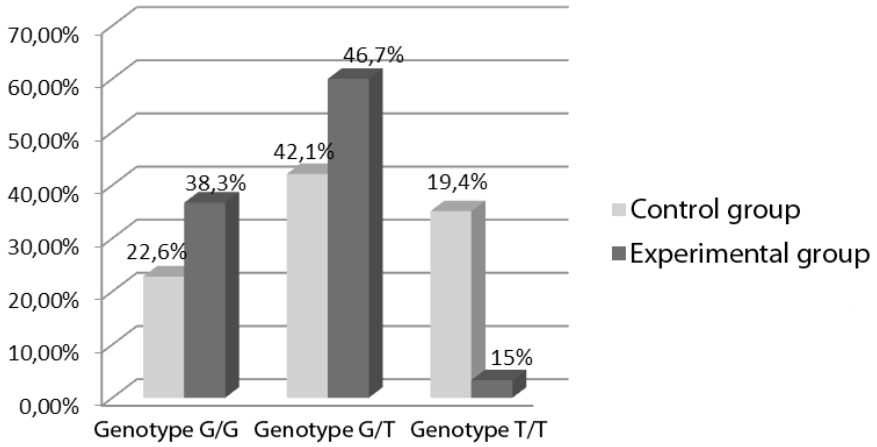

Figure 3. The distribution of genotype frequencies of the polymorphism 455T>C of APOC3 gene in the control and experimental groups

Table 5. – The results of the statistical analysis of genetic association of genotypes of ApoC3 gene with MMS

Model of inheritance	Genotypes	cases	Controls	χ^2	p	OR	
		n = 60	n =31			Value	95% CI
General inheritance model (chi-square test, df = 2)	*T/T*	0.383	0.226	2.30	0.32	2.13	0.79-5.73
	T/C	0.467	0.581			0.63	0.26-1.52
	C/C	0.150	0.194			0.74	0.24-2.30
The additive model of inheritance (Cochran-Armitage test for linear trends, xi = [0,1,2], df = 1)	*T/T*	0.383	0.226	1.77	0.18	2.13	0.79-5.73
	T/C	0.467	0.581			0.63	0.26-1.52
	C/C	0.150	0.194			0.74	0.24-2.30
The dominant model of inheritance (Chi-square test, df = 1)	T/T+T/C	0.850	0.806	0.28	0.6	1.36	0.44-4.25
	C/C	0.150	0.194			0.74	0.24-2.30
The recessive model of inheritance (Chi-square test, df = 1)	*T/T*	0.383	0.226	2.30	0.13	2.13	0.79-5.73
	T/C+C/C	0.617	0.774			0.47	0.17-1.26

References:

1. GenBank: URL: http://www.ncbi.nlm.nih.gov. GenBank is the NIH genetic sequence database, an annotated collection of all publicity available DNA sequences.
2. Yang W. S., Tsou P. L., Lee W. J. et.al. Allele-specific differential expression of a common adiponectin gene polymorphism related to obesity//J Mol Med – 2003, – 81:428–434).
3. Sun Y., Xun K., Wang C. et. al. Adiponectin, an unlocking adipocytokine//Cardiovasc Ther. – 2009. – Vol. 27, – No 1. – P. 59–75.
4. Fumeron F., Aubert R., Siddiq A., Betoulle D., Péan F., Hadjadj S., Tichet J., Wilpart E., Chesnier M.-C., Balkau B., Froguel P., Marre M. Adiponectin gene polymorphisms and adiponectin levels are independently associatedwith the development of hyperglycemia during a 3-year period//Diabetes. – 2004. – Vol. 53. – P. 1150–1157.
5. Pennacchio LA1, Rubin EM. Apolipoprotein A5, a newly identified gene that affects plasma triglyceride levels in humans and mice. Arterioscler Thromb Vasc Biol. – 2003. – Apr 1. – 23 (4). – 529–34.
6. Talmud P. J., Humphries S. E. Apolipoprotein C–III genevariation anddyslipidaemia//Curr. Opin. Lipidol. – 1997. – P. 154–158.
7. Калькулятор для расчета статистики в исследованиях «случай-контроль» [http://gen-expert.ru/calculator_or.php].

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Productivity survey of gypsiferous soils in golodnaya steppe of Mirzachul Oasis

Abstract: The article presents the discussion of the research data obtained from survey of gypsiferous soils in Golodnaya Steppe of Mirzachus oasis. As a result of the research there were developed survey factors for cultivated vegetable crops such as potato, onion, tomato and cabbage and the content of gypsum in the soils of Golodnaya steppe.

Keywords: irrigation, soil survey, sierozem meadow, carbonates, yield total nitrogen, phosphorus, potato, cabbage, tomato, onion, gypsum.

Introduction. Cultivation limits have already gone beyond traditional cultivated lands. Practically all flat lands have been assimilated. At present within the contours of irrigated assimilation of lands there are the lowest lying lands with drained swamps, lakes and near mountain lands with undeveloped soils. Various soil types from various geomorphological elements are under cultivation nowadays. Before the science of soil-melioration there a number of problems which require solutions. Soil scientists are facing great challenges in mapping and surveying the quality of newly assimilated lands and improving the quality of irrigated arrays. Traditional methods of soil survey mapping of gypsiferous soils do not fit the requirements of present, therefore there is a need for the development of survey factors on occurrence of gypsiferous horizons.

Gypsiferous horizons are spread across desert and light sierozem zones. Vast areas of gypsiferous soils are found in Ferghana valley, Djizzak, Golodnaya Steppe, Malikchul, Sherabad deserts and Ustyurt plateau. With the purpose of surveying the fertility of these massifs there is a need for the development of survey factors. Gypsiferous level and the form of gypsum accumulation and its location in their profile determined production capacity of these soils.

Methodology of the research. According to the soil climatic conditions object of the research belongs to Golodnaya Steppe district. On thermal resources the region belongs to moderately warm and hot zones. Average temperature in January is equal to — 1.4–2.5$^{0.}$ Bare minimum is equal to 32.3$^{0.}$ Snow covering is unstable. Number of days with snow covering are 33–36 days per year. Frost-free season is 192–210 days per year. Precipitations are in few amounts — on average 300–320 mm a year. The summer is very hot and dry. Bare maximum is 44–45$^{0.}$ Agriculture is possible only in cultivated lands. Thermal resources of the region provide development and maturing mid-ripening variety of cotton, vegetable and melon crops [1]. According to the soil covering the region belongs to cultivated meadow and sierozem-meadow lands of Central Asian provinces of mountainous and near mountain, semidesertic zones.

In 2010–2013 field studies were carried out in 20 key areas and 200 areas were chosen for calculation of crop capacity. Areas in dimension of 10X10 meters were located in such a way that they could cover all main soil varieties. Calculation of crop capacity was made employing the method developed by Dospehov [1, 117–290]. Then the statistical data processing obtained from crop capacity calculation was done in order to compute average yields and search of correlation dependencies between certain properties of soil and productivity of vegetable crops.

Research results and their discussion. Presence of gypsum in loamy soil and clay up to 10–30% sharply increases density of soil composition. Weak and hardly soluble salts (gypsum, carbohydrates of calcium and magnesium) are physiologically not harmful but in high level of presence as well as readily soluble salts present land-reclamation difficulties. Accumulation of gypsum and carbonates in soils proceeds along with the decrease of interstices of soil and increase in the soil density and carbonization of horizons into blended mass. At the same time change in the water physical properties of soil depends on depth of bedding and accumulation of gypsum horizons. Volume weight in superficial accumulation of powdery gypsum equals to 1.31–1.41 g/cm^3, porosity 42–47%, in the bedding on the middle and lower layers of soil profile in the form of falky and coarse gypsum 1.60–1.74 g/cm^3 and 31–40% respectively [3].

Being present on the upper layers of the profile, gypsum horizons sharply decrease productive capacity of soil [7]. Even after 15 years of reclamation of the southern parts of Golodnaya Steppe productivity of cotton remains low, equaling 7–13 c/ha, in comparison in non-gypsum sierozem meadow lands cotton yield equals to 25–35 c/ha. This is explained by the fact that in conditions of high level of soil density not only the intrusion of cotton plant roots into the depth is complicated but also it decreases water physical properties of soil and lowers soil's nourishing property. High contains (up to 50% and above) of crystallized and coarse gypsum and their close to surface bedding leads to piping and other negative phenomena during cultivation periods.

It has been found experimentally that gypsum, which has low water-retaining properties, lowers general deposit of water. In weak gypsiferous lands of Malikchul desert even in high levels of fertilizing cotton productivity is 6 c/ha lower than in non-gypsiferous lands. In high contains of gypsum (40–50%) cotton productivity equals only to 3.2 c/ha.

Increase of small-grained gypsum in root layer of cotton (0–70 cm) only to 1% leads to decrease in the productivity of cotton crop up to 1.6–1.7%. This is caused by the deterioration of water-physical properties of soil.

Minashina [6] suggests the following classification of gypsiferous soils according to the content of gypsum in gypsiferous

horizons: non-gypsiferous soils <10%, weak-10–20%, mid-20–40%, and strongly gypsiferous soils — above 40%.

In gypsiferous soils of Golodnaya Steppe maximum quantity of gypsum is found in dense gypsiferous strata, whereas maximum amount of carbonates is found underneath and even greater quantity of readily soluble salts are found on gypsum strata and above [5].

According to the content of humus as well as nitrogen, meadow lands are richer than light sierozems of Golodnaya steppe and content of them depends on the degree of salinity. On topsoil of nonsaline soils content of humus equals to 1.2–1.6%, in weak saline soils 1.0–1.3%, and in mid saline soils 0.6–0.8%. On the subsurface the content is 0.6–0.7; 0.4–0.5; and 0.3–0.5% respectively. It is explained by the fact that as the content of salts increase in soil vegetation becomes thinned and respectively there is less availability for the accumulation of organic mass as well as roots. In these soil types content of humus is inversely proportional to the degree of soil salinity.

Content of total yield of nitrogen was equal to 0.14–0.18 in arable horizons of non saline soils, in the analogous horizons of weak saline soils it was equal to 0.08–0.10%, in mid saline soils 0.04–0.07% respectively. В подпахотном горизонте соответственно 0,03–0,06; 0,02–0,05; 0,02–0,03%. In saline soils correlation of C: N is considerably lower rather than in non-saline soils. Due to the low content of carbon on saline soils, correlation of C: N converges and equals to from 5.4 to 7.7 (Table 1).

Content of total yield of phosphorus is equal to 0.06–0.10%. Kamilov [4] considers that there is no correlation between total yield of phosphorus and degree of salinity in previously cultivated as well as newly cultivated lands. Also there is no definite dependence of phosphorus content on the degree of salinity in newly irrigated sierozem meadow soils.

Total yield of potassium on arable and subsurface horizons is equal to on average 1.6–2.8%.

Carbonates according to the profile on the researched soils are evenly distributed. In some cases there is a decrease of CO_2 — carbonates down to the profile. Content of CO_2 — carbonates is equal to 5.9–8.2% on average.

Table 1. – Chemical indicators of cultivated meadow soils,%

Depth, Cm	Gross forms,%					CO_2 carbonates%	SO_4 Gypsum%
	Humus	Nitrogen	C: N	Phosphorus	Potassium		
Non-Saline							
0–37	1,41	0,11	6,8	0,10	2,8	7,21	0,18
37–56	0,60	0,04	7,7	0,07	2,1	6,54	0,91
80–100	0,47	0,03	7,0	0,07		7,49	0,42
120–130	0,31	0,02	6,1	0,06		8,24	0,69
Weak Saline							
0–36	1,31	0,11	6,9	0,08	2,8	5,90	0,63
36–54	0,50	0,04	6,1	0,06	1,6	6,66	1,03
54–80	0,42	0,04	5,9	0,06		6,77	12,23
90–100	0,23	0,02	5,9	0,06		7,60	11,26
Mid-Saline							
0–33	0,73	0,06	6,3	0,08	2,1	6,44	0,41
33–45	0,43	0,04	5,4	0,07	2,0	6,37	8,66
55–65	0,34	0,03	6,4	0,06		6,90	14,18
75–90	0,27	0,02	6,0	0,06		7,11	12,18
110–125	0,22	0,02	6,0	0,05		7,00	13,44

Gypsum in some horizons of weak and mid saline soils can be found in the form of concretion or dense layer in the depth of 40–80 cm. Content of humus on the upper nonsaline soils is equal to 0.18–0.91%, in weak saline soils 0.63–1.03% and in mid saline soils 0.41–8.66% respectively. In the lower horizons of weak and mid saline soils it is equal to 11.26–14.18% (Table 1).

Identification of crop capacity dependence of vegetable crops on the level of gypsification has shown considerable correlation between them (-0.68 –0.75). For a potato this indicator is –0.75, for cabbage –0.76, for tomato –0.68, and for onion — 0.71 respectively (Table 2).

Table 2. – Variational-statistical indicators of correlation between productivity of vegetable crops and gypsiferousness of soils

№	Depth, cm	Number of permanent quadrates	Content of gypsum,% X	Productivity c/ha y	XY	X^2	y^2
1	*2*	*3*	*4*	*5*	*6*	*7*	*9*
	Potato						
1		3	3	134	402	9	17956
2	30–50	4	16	118	1888	256	13924
3	30	2	14	95	1330	196	9025
4	50–100	2	26	108	2808	676	11664
5	30–50	2	28	91	2546	784	8281
6	30	2	24	74	1776	576	5476

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
		S	S	S	S	S	S
	Cabbage						
1		3	5	315	1575	25	99225
2	30–50	4	12	296	3552	144	87616
3	30	2	14	268	3752	196	71824
4	50–100	2	23	255	5865	529	65025
5	30–50	3	28	230	6440	784	52900
6	30	2	26	189	4914	676	35721
		S	S	S	S	S	S
	Tomato						
1		6	0,5	320	160	0,25	102400
2	30–50	2	15	275	3850	196	75625
3	30	3	16	256	4096	256	65536
4	50–100	3	26	240	6240	676	57600
5	30–50	2	25	186	4650	625	34596
6	30	2	30	173	5190	900	29929
		S	S	S	S	S	S
	Onion						
1		5	0,8	208	166,4	0,64	43264
2	30–50	2	18	189	3402	324	35721
3	30	3	14	166	2324	196	27556
4	50–100	2	23	141	3243	529	19881
5	30–50	2	29	125	3625	841	15624
6	30	2	27	144	3888	729	20736
		S	S	S	S	S	S

As it is shown on Table 3 close bedding of gypsum horizons the most greatly influences the decrease of potato's productivity and tomato which is related to the relatively interpenetratable root systems of these plants. Plants such as onion with superficial root system, shows relatively small reaction to the depth of gypsum bedding. This is especially noticeable in weak degree of gypsiferousness of soil.

Table 3. – Survey factors on gypsiferous horizons and the level of gypsum content

Level of gypsum content	**Depth, cm**	**Potato**		**Cabbage**		**Tomato**		**Onion**	
		Productivity, c\ha	**Survey factors**	**Productivity, c\ha**	**Survey factors**	**Productivity, c\ha**	**Survey factors**	**Productivity, c\ha**	**Survey factors**
Non gypsified		134	1,00	315	1,00	320	1,00	208	1,00
Weak gypsified 11–20% of gypsum	30–50	118	0,90	296	0,95	275	0,85	189	0,90
	30	95	0,70	268	0,85	256	0,80	166	0,80
Mid gipsified 21–40% and above content of gypsum	50–100	108	0,80	255	0,80	240	0,75	141	0,70
	0–30	91	0,70	230	0,75	186	0,60	125	0,60
	30	74	0,55	189	0,60	173	0,55	114	0,55

Survey factors for non gypsum sierozem meadow soils and vegetable crops (potato, cabbage, tomato and onion) are equal to 1.00. With the increase of the content of gypsum on horizons adjustment coefficients of gypsiferous soils decrease.

References:

1. Babushkin L. N., Kogay N. A., Zakirov Sh. S. Agroklimaticheskiye usloviya selskogo hozyastva Uzbekistana. – Tashkent. Mehnat, – 1985. – P. 169–193.
2. Dospehov B. A. Metodika polevogo opyta. – Moskva. Agropromizdat, – 1985. – P. 117.
3. Isokov V.Yu. Svoystva arzykovyh pochv sentralnoy Fergany. Izd. AN UzSSR. – Tashkent, – 1991. – P. 90–91.
4. Kamilov O.K Meliorasiya zasolennyh pochv Uzbekistana. Fan, – Tashkent. – 1985. – P. 84–85.
5. Lunov V. G. Vliyaniye slabovodopronisayemyh gipsirovannyh prosloev pochvogruntah na agromeliorativnye usloviya Golodnoy stepi. Avtoreferat diss. Kand. S. h.n. – Tashkent, – 1966. – 22 p.
6. Minashina N. G. Meliorasiya zasolennyh pochv. – Moskva, Kolos. – 1978. – P. 160–161.
7. Molodsov V. A. Prichiny nizkogo plodorodiya sierozemno-lugovyh gipsonosnyh pochv Djizzakskoy stepi./Jurnal Pochvovedeniye, – 1982, – 3.

Section 2. Biotechnology

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Screening of lactic acid bacteria for antagonism toward pathogens and biofilm-forming activity

Abstract: Probiotic preparations based on lactic acid bacteria are used widely in clinical practice. Probiotic bacteria must have a set of properties that allow them to compete with pathogens and opportunistic pathogens in the gut. These characteristics are antagonism, bacteriocin-producing activity, the ability for adhesion, resistance to hydrochloric acid and bile, and safety in use. Twenty-five strains of lactic acid bacteria (LAB) from four genera were obtained from the Republican Collection of Microorganisms: *Lactobacillus* (19 strains), *Lactococcus* (3), *Pediococcus* (2), and *Leuconostoc* (1). We screened these LAB for antagonism toward pathogenic and biofilm forming activity. Antagonism was determined by the agar diffusion method against *Escherichia coli*, *Staphylococcus aureus*, *Candida albicans*, and *Serratia marcescens.* Determination of biofilm-forming activity was carried out by serial dilutions of biofilms formed *in vitro* on two materials, cover glass and polystyrene plate. The most antagonistic activity was showed against *S. aureus* and *E. coli*. As a result of the investigations were selected strains: *Lactobacillus casei* 3, which showed antagonism toward conditionally pathogenic microorganisms; *L. plantarum* 8RA-3 pl+ and *L. casei* Г, which have high biofilm forming ability.

Keywords: Lactic acid bacteria, Antagonism; Biofilm formation.

Introduction

One of the commonest current directions of microbiology is the search for new strains of lactic acid bacteria (LAB) to create probiotic products. One of the major components of starter cultures for such drugs is typically *Lactobacillus* bacteria. Naturally introduced probiotic cultures have a positive impact on the physiological, biochemical and immune response of the host organism via stabilization and optimization of its normal microflora function. Microorganisms of the genus *Lactobacillus* are widespread in nature, and some species are the most important representatives of the microbiota of the human

body [1; 2]. Because they produce organic acids, hydrogen peroxide and bacteriocins, many strains of lactobacilli show antagonistic activity toward pathogenic and conditionally pathogenic microorganisms [3; 4; 5]. In aggregate, these characteristics are the main mechanisms of action of *Lactobacillus* to inhibit the growth and reproduction of pathogenic and conditionally pathogenic microorganisms, in restoring microbiocenosis in the intestinal biotope, in strengthening the barrier function of intestinal epithelial cells, and in modulation of the immune response [6; 7; 8; 9].

In medical practice, research into and prevention of pellicle formation by pathogenic and opportunistic pathogenic microorganisms is particularly important, as this contributes to chronic infection and weakens the effectiveness of treatment [10]. Nosocomial infections (infections acquired in hospital) are the fourth leading cause of death in the United States, and about 65% of these infections are caused by biofilms on implanted medical devices such as intravenous catheters [11]. Biofilms also show increased resistance to antibiotics [12]. The ability to form biofilms is an important property for both pathogenic bacteria and for industrially significant bacteria that are used in various processes, such as fermentation and/or preservation of food and feed [13]. Use of LAB and their metabolites is the most common and popular method of natural protection; protective biofilm agents may be formed by LAB. Current hypotheses concerning *Lactobacillus* biofilms protecting against pathogenic bacteria involve the production of antimicrobial metabolites or inhibitory extracellular polymeric substances that surround the pathogenic bacteria, modulating *Lactobacillus*-pathogen interfaces [14; 15; 16; 17].

The aim of this work was screening of LAB active cultures with high antagonistic and biofilm forming activity.

Materials and methods

This research used 25 strains of LAB from the Republic Collection of Microorganisms (RCM), Kazakhstan. Twenty-one strains were from the culture collection (*Lactobacillus casei* Г B-RKM 0004, *L. casei* 3 B-RKM 0008, *L. brevis* 3–9 B-RKM 0010, *L. fermentum* 90T C 4-pl B-RKM 0014, *L. plantarum* 8RA 3-pl B-RKM 0015, *L. plantarum* pl 38 2/T B-RKM 0017, *L. fermentum* ATCC 9338 B-RKM 0018, *L. casei* L B-RKM 0027, *L. delbrueckii* subsp. *lactis* СГ-1 Г B-RKM 0044, *L. fermentum* 136 B-RKM 0103, *L. plantarum* 2 B-RKM 0152, *L. fermentum* 96 B-RKM 0155, *L. fermentum* B-RKM 0203, *L. casei* BI 005 B-RKM 0208, *L. brevis* L5 B-RKM 0347, *L. brevis* L9 RKM 0348, *L. sakei* 2 a B-RKM 0640, *L. sakei* 7a B-RKM 0636, *Pediococcus pentosaceus* 8a B-RKM 0635, *Lactococcus* (*Lc.*) *garvieae* 10 a B-RKM 0639, *L. sakei* 24 a B-RKM 0559). Also in this study were study four strains of LAB from the working collection: *P. pentosaceus* 1a, *Leuconostoc* (*Ln.*) *garlicium* 3 a, *Lc. lactis* 14a, and *Lc. lactis* 17a.

Determination of antagonistic activity of LAB

Antagonistic activity of LAB was determined by the agar diffusion method [18] with test strains *Escherichia coli* ATCC 25922 B-RKM 0447, *Staphylococcus aureus* 209 P B-RKM 0057, *Candida albicans* ATCC 885–653 Y-RKM 0475, and *Serratia* (*Ser.*) *marcescens* 221F B-RKM 0059, from the of RCM. *E. coli* ATCC 25922, *S. aureus* 209 P, and *Ser. marcescens* 221F were incubated overnight in nutrient broth (HiMedia, Mumbai, India) at 37 °C, and *C. albicans* ATCC 885–653 in Sabouraud dextrose broth (SDB, HiMedia) at 37 °C. A test-culture was a suspension of cells at 10^9/ml applied to the surface of a Petri dish containing meat-peptone agar (Nutrient agar (HiMedia) with Meat extract powder (Accumix, Belgium)). After this, a 5-mm-diameter hole was cut in the plate with a drill and filled with cultures of LAB (0.1 ml). Incubation was carried out at 37 °C. Zones of inhibition were measured after 48 h and are presented with the diameter of the hole subtracted. Antagonistic activity was evaluated by the lack of growth of the indicator strain around the cultures of the LAB strain.

Determination of biofilm-forming activity of LAB

To determine the biofilm forming activity of LAB, we used a serial dilution method — direct quantification of colonies of LAB in the biofilm [19; 20]. For direct quantitative colony counting of LAB in the pellicle, the method of serial dilution was used, with, as substrate, two materials on whose surfaces LAB form a biofilm *in vitro*: coverslips and polystyrene plates. For this purpose, daily culture was grown on MRS medium. Then, the polystyrene and coverslip plate were placed on a sterile "edge" in weighing bottles (2×2 cm). Weighing bottles containing a cover glass and polystyrene plate were filled with 90% ethanol for 45 min, then the alcohol was decanted and the weighing bottle was rinsed with distilled water. It was dried at 37 °C for 30–40 min in sterile thermostat. In total, 4 ml of sterile MRS medium and 0.1 ml of daily culture of lactobacilli were added to the sterilized, dried weighing bottles with a cover glass and polystyrene plate. They were incubated at 37 °C for 24 h. Then, the culture fluid was gently poured out by tilting the weighing bottle. The LAB biofilm-coated cover glass and polystyrene plate were removed with sterile forceps and placed separately in sterile weighing bottles, to which 2 ml of saline were added. Repeatedly pipetting the saline completely washed away the biofilms of lactobacilli from the surface of the cover glass and polystyrene plate. We prepared 10-fold serial dilutions from each biofilm sample and plated them on dense medium MRS-agar. Cells were incubated at 37 °C for 24–36 h, followed by counting the colonies at various dilutions. The average was determined in CFU/ml. The results allow the determination of the ratio of viable colonies on the glass and polystyrene surfaces. The number of viable of LAB indicates the biofilm forming activity of different strains.

Results

Antagonistic activity of LAB

The most antagonistic activity was showed against *S. aureus* and *E. coli*, the percentage of active strains LAB was 100% and 92% respectively. Cultures of RCM strains *L. casei* T B-RKM 0004, *L. casei* 3 B-RKM 0008, *L. brevis* 3–9 B-RKM 0010, *L. fermentum* 90T C 4-pl B-RKM 0014, *L. plantarum* 8RA-3 pl+ B-RKM 0015, *L. plantarum* pl-38 2/T B-RKM 0017, *L. fermentum* ATCC 9338 B-RKM 0018, *L. casei* L B-RKM 0027, *L. delbrueckii* subsp. *lactis* Cg-1 B-RKM 0044, and *L. fermentum* 136 B-RKM 0103 had high antagonistic activity toward all investigated test strains; the diameter of the zones of inhibition was range 10–13 mm. Antagonistic activity of LAB in relation to the test cultures is shown in Figure 1.

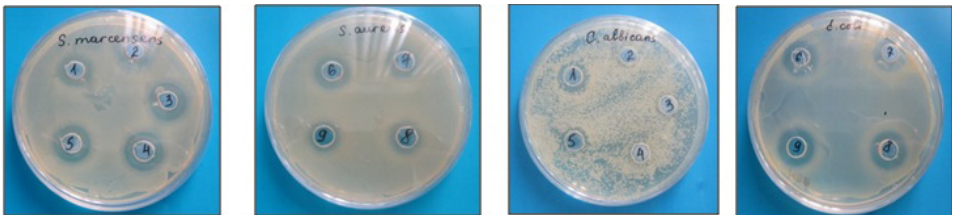

Figure 1. Antagonistic activity of LAB. The numbers in the wells 1, 2, 3, 4, 5 – replicate of test strain

The most antagonistic activity of the studied strains showed against enteric bacteria (*E. coli*) and yeast (*C. albicans*), where the zones of inhibition ranged from 5.5 to 13.0 mm: *Lactobacillus casei 3* B-RKM 0008, *L. casei L* B-RKM 0027, *L. delbrueckii CG-1* B-RKM 0044, *L. fermentum* B-RKM 0203, *L. fermentum* 90T C4-pl B-RKM 0014, *L. brevis L9* B-RKM 0348, *L. fermentum ATCC 9338* B-RKM 0018, *L. brevis 3–9* B-RKM 0010, *L. casei BI 005* B-RKM 0208, *L. casei GV* B-RKM 0004, *L. plantarum pl-38* B-RKM 0017.

All investigated collection strains and working isolates showed an average or high degree of antagonism toward at least some investigated test cultures. However, strains *L. plantarum* 2 B-RKM 0152, *L. fermentum* 96 B-RKM 0155, *L. fermentum* B-RKM 0203, *L. casei* BI 005 B-RKM 0208, *L. brevis* L5 B-RKM 0347, and *L. brevis* L9 B-RKM 0348 did not show an inhibitory effect toward *S. marcescens. L. sakei* 24a B-RKM 0559, *L. sakei* 7a B-RKM 0636, *Lc. garvieae* 10a B-RKM 0639, *L. sakei* 2a B-RKM 0640, *P. pentosaceus* 1a, *Ln. garlicium* 3a, *Lc. lactis* 14a, and *Lc. lactis* 17a showed higher antagonistic activity toward the bacterial test strains, than toward the yeast *C. albicans*.

Determination of the biofilm-forming activity of LAB

Lactobacilli may actively form biofilms on the mucosal surface. Biofilm-formation, as well as the adhesive activity of lactobacilli, is regarded as a factor that enhances the colonization resistance of the resident intestinal microflora, and increases their probiotic properties and adaptation. Table 1 shows the results of *in vitro* biofilm formation in 10^{10} dilution for the 25 LAB strains we tested. The index of maximum viability strains *L. delbrueckii* C-1 B-RKM 0044, *L. casei* L B-RKM 0027, *L. fermentum* B-RKM 0203, *Lc. garlicium* 3a, and *Lc. lactis* 14a, was $\leq 10^6$ CFU/ml; thus the biofilm formatting activity was low and the data are not included in Table 1.

Biofilm formation on the surface of a cover glass was found for strains *L. casei* G B-RKM 0004, *L. brevis* 3–9 B-RKM 0010, *L. plantarum* 8RA-3 pl+ B-RKM 0015, *L. plantarum* pl-38 2/T B-RKM 0017, *L. fermentum* ATCC 9338 B-RKM 0018, *L. fermentum* 96 B-RKM 0155, *L. fermentum* 136 B-RKM 0103, *L. plantarum* 2B B-RKM 0152, and *P. pentosaceus* 8a, maximum indicators of viability were observed in the dilutions 10^8–10^{10} CFU/ml.

Table 1. – Viability Indicator of lactic acid bacteria on polystyrene and coverslips

Strains of LAB	Number of strain B-RKM	Viability Indicator, CFU/ml, 10^{10}	
		polystyrene	coverslips
L. casei Г	0004	4.0±1.0	29.7±1.03
L. fermentum 96	0155	12.0±4.0	13.0±0.88
L. plantarum 2	0152	4.5±1.50	12.0±2.0
L. fermentum ATCC 9338	0018	11.0±2.0	10.5±4.50
L. plantarum pl-38 2/T	0017	6.7±0.67	14.5±2.50
L. plantarum 8RA-3 pl	0015	38.0±1.0	2.0±1.0
L. fermentum 136	0103	29.5±0.50	10.0±5.0
L. brevis 3–9	0010	13.5±1.03	8.0±2.16
L. casei 3	0008	7.5±2.50	3.0±0.25
L. brevis L5	0347	1.0±0.50	–
L. casei BI 005	0208	1.0±0.50	3.0±0.25
L. brevis L9	0348	2.0±0.17	1.0±0.50
P. pentosaceus 1 a	–	9.0±2.42	2.5±0.96
L. sakei 2 a	0640	–	1.7±0.67
P. pentosaceus 8a	0635	19.7±4.66	11.2±4.99
L. garvieae 10 a	0639	5.2±0.63	3.5±0.50
L. lactis 17a	–	8.2±1.70	5.5±1.50
L. sakei 24 a	0559	5.0±1.0	–

The index of viability of strains *L. fermentum* 90T C4-pl B-RKM 0014, *L. sakei* 2a B-RKM 0640, and *L. sakei* 7a B-RKM 0636, is stated only in the eighth breeding; Strain *L. casei* G B-RKM 0004 differs in the highest rates of viable colonies, 29.7×10^{10} CFU/ml on coverslips.

While evaluating biofilm formation on a cover glass surface, it was found that *L. fermentum* 90T C4-pl B-RKM 0014, *L. brevis* L5 B-RKM 0347, *L. delbrueckii* Cg-1 B-RKM 0044, *L. casei* L B-RKM 0027, *L. fermentum* B-RKM 0203, *Ln. garlicium* 3a, *L. sakei* 7a B-RKM 0636, *Lc. lactis* 14a, and *L. sakei* 24a B-RKM 0559 showed little biofilm-formation (maximum rate of viability $\leq 10^6$ CFU/ml). Overall, the highest indicator of viability was *L. plantarum* 8RA-3 pl+ B-RKM 0015; it amounted 38×10^{10} CFU/ml, on a polystyrene plate.

In terms of the different surfaces that were tested, it was found that *L. plantarum* 8RA-3 pl + B-RKM 0015 most actively formed a biofilm on the surface of polystyrene, and strain *L. casei* T B-RKM 0004 on the surface of a cover glass.

Discussion

There is growth in the production of probiotics all over the world, as they are popular among people who support their health by using natural remedies; probiotic preparations are used in the food industry and medicine as pharmaceuticals or dietary supplements. Lactobacilli have been extensively investigated for probiotic activity, especially antagonism toward pathogenic microorganisms.

Scientists from Mongolia [21] screened 543 isolates of LAB derived from national dairy products in Mongolia. Investigated strains were tested for tolerance to gastric juice and bile acids, gassing and adhesion to Caco-2 cells. As a result, 10 prospective homofermentative probiotic strains of LAB were selected and identified as *L. plantarum* and *L. paracasei* spp. Heterofermentative *L. fermentum* were also obtained, which can be used as starters for producing dairy products.

Jalilsood et al. [22] identified a new isolate of *L. plantarum* PA21, that could form a strong biofilm in pure culture and in combination with pathogenic and food-spoiling bacteria, such as *Salmonella enterica*, *B. cereus*, *Pseudomonas fluorescens* and *Aeromonas hydrophila*. Exposure to *Lb. plantarum* PA21 significantly reduced the number

of *P. fluorescens*, *A. hydrophila* and *B. cereus* cells in the biofilm over 2-, 4-and 6-days. However, despite a reduction in the number of *S. enterica* cells, this pathogen showed greater resistance to the *Lactobacillus plantarum* PA21, either in the planktonic or biofilm phase. *Lb. plantarum* PA21 was also found to be able to constitutively express GFP when transformed with the expression vector pMG36e, which harbors the *gfp* gene as a reporter, demonstrating that the newly isolated strain could be used as host for genetic engineering.

Researchers worldwide spend search of strains of LAB that have antagonistic and biofilm forming activity for various applications in the food and pharmaceutical industries.

The advantage and novelty of the present research lies in the fact that it screened active strains of LAB not only for antagonism to opportunistic pathogens, but for biofilm-forming ability. Bacteriocin production, along with the production of for example, lactic acid, hydrogen peroxide, and lysozyme, relates to antagonism [23, 24, 25] biofilm formation determines the ability of microorganisms to actively colonize the mucosal surfaces of an organism. The biological characteristics of biofilm formation in *S. aureus* have been investigated as a factor that enhances their pathogenic potential, and in lactobacilli as a factor that enhances their ability to colonize the vaginal biotope [26, 27].

The present research revealed that the best among the tested species in biofilm-formation were *L. plantarum* 8RA-3 pl + B-RKM 0015 and *L. casei* T B-RKM 0004, which actively colonized the surfaces of polystyrene plates and cover glass, respectively. During study of the antagonistic activity of all LAB strains, it was found that *L. casei* 3 B-RKM 0008 had quite a strong antimicrobial effect on all test cultures.

References:

1. Rybalchenko O.V., Bondarenko V.M. The formation of biofilms by symbiotic intestinal microbiota representatives as a form of existence of bacteria. Bulletin of St. Petersburg State University – 2013. – 3: 179–186.
2. Slaver C.M. Lactobacillus: a Review. Clin Microbiol Newsletter – 2008. – 30: 23–27.
3. Abdel-Daim A., Hassouna N., Hafez M., Aldeen-Ashor M. S., Aboulwafa M. M. (2013) Antagonistic Activity of Lactobacillus Isolates against Salmonella typhi In Vitro. Biomed Res Int. – DOI: 10.1155/2013/680605
4. Xiaoming Liu, Wenyu Liu, Qiuxiang Zhang et al. Screening of lactobacilli with antagonistic activity against enteroinvasive Escherichia coli**.** Food Control – 2013. – 30 (2): 563–568.
5. Wagenlehner F. M., Naber K. G. Treatment of bacterial urinary tract infections presence and future. Eur Urol – 2006. – 49 (2): 235–244.
6. Tallon R., Bressollier P., Urdaci MC Isolation and characterization of two exopolysaccharides produced by Lactobacillus plantarum EP56. Res Microbiol – 2003. – 154 (10): 705–712.
7. Stern N. J., Svetoch E. A., Eruslanov B. V. et al. Isolation of a Lactobacillus salivarius Strain and Purification of Its Bacteriocin, Which Is Inhibitory to Campylobacter jejuni in the Chicken Gastrointestinal System. Antimicrob Agents Chemother – 2006. – 50 (9): – 3111–3116. DOI: 10.1128/AAC.00259–06.
8. Iqbal M. Z., Qadir M. I., Hussain T., Janbaz K. H., Khan Y. H., Ahmad B. Review: probiotics and their beneficial effects against various diseases. Pak J Pharm Sci – 2014. – 27 (2): 405–415.
9. Vizoso Pinto M. G., Rodriguez Gómez M., Seifert S., Watzl B., Holzapfel W. H., Franz C. M. Lactobacilli stimulate the innate immune response and modulate the TLR expression of HT29 intestinal epithelial cells in vitro. Int J Food Microbiol – 2009. – 133 (1–2): 86–93.– DOI: 10.1016/j.ijfoodmicro. – 2009. – 05.013.
10. O'Toole G., Kaplan H.B., Kolter R Biofilm formation as microbial development. Annu Rev Microbiol – 2000. – 54: 49–79.
11. Tetz V. V. The effect of antimicrobial agents and mutagen on bacterial cells in colonies. Med Microbiol Lett – 1996. – 5: 426–436
12. Hoiby N., Bjarnsholt T., Givskov M., Molin S., Ciofu O Antibiotic resistance of bacterial biofilms. Int J Antimicrob Agents – 2010. – 35 (4): 322–332. – DOI: 10.1016/j.ijantimicag. – 2009. – 12.011
13. Matsubara V. H., Wang Y., Bandara HMHN, Mayer MPA, Samaranayke L. P. Probiotic lactobacilli inhibit early stages of Candida albicans biofilm development by reducing their growth, cell adhesion and filamentation. Appl Microbiol Biotechnol – 2016. – 100: 6415–6426. – DOI: 10.1007/s00253–016–7527–3
14. Djeribi R., Bouchloukh W., Jouenne T., Menaa B. Characterization of bacterial biofilms formed on urinary catheters. Am J Infect Control – 2012. – 40 (9): 854–859. – DOI: 10.1016/j.ajic.2011.10.009
15. Ravel J., Gajer P., Abdo Z. et al Vaginal microbiome of reproductive-age women//Proc Natl Acad Sci U S A – 2011. – 108 (1): 4680–4687. DOI: 10.1073/pnas.1002611107
16. Gerard C. L. Wong, George A. O'Toole All together now: Integrating biofilm research across disciplines. MRS Bull – 2011. – 36 (5): 339–342. – DOI: 10.1557/mrs.2011.64
17. Sarah Lebeer, Tine L. A. Verhoeven, Mónica Perea Vélez, Jos Vanderleyden, Sigrid C. J. De Keersmaecker Impact ofenvironmental and genetic factors on biofilm formation by the probiotic strain Lactobacillus rhamnosus G. G. Appl Environ Microbiol – 2007. – 73 (21): 6768–6775. – DOI: 10.1128/AEM.01393–07
18. Netrusov A. I. Workshop on microbiology. – Moscow: Academia, – 2005; – P. 531–532.
19. Romanov Y.M. et al. The ability to form biofilm in artificial systems in different strains of Salmonella typhimurium. Journal of microbiology, epidemiology and immunobiology – 2006. – 4: 38–42.
20. Merritt J. H., Kadouri D. E., O, Toole G. A. Growing and analyring static biofilms. Curr. Protoc. Microbiol. – 2005. – DOI: 10.1002/9780471729259.mc01b01s00
21. Tsend-Ayush Ch, Ganina VI The probiotic properties of lactic acid bacteria isolated from domestic dairy products Mongolia. Engineering and technology of food production – 2013. – 1:1–6.
22. Jalilsood T., Baradaran A., Ai-Lian Song A. et al Inhibition of pathogenic and spoilage bacteria by a novel biofilm-forming Lactobacillus isolate: a potential host for the expression of heterologus proteins. Microb Cell Fact. – 2015. – DOI: 10.1186/s12934–015–0283–8
23. Berry A., Franco C., Zhang W., Middelberg A. Growth and lactic acid production in batch culture of Lactobacillus rhamnosus in a defined medium. Biotechnology Letters – 1999. – 21: 163–167.

24. Ha M. Y., Kim S. W., Lee Y. W., Kim M. J., Kim S. J. Kinetics analysis of growth and lactic acid production in pH-controlled batch cultures of Lactobacillus casei KH-1 using yeast extract/corn steep liquor/glucose medium. J Biosci Bioeng – 2003. – 96 (2): 134–140.
25. Parfenov A. I., Bondarenko V. M. With a century of experience has given us the knowledge of symbiotic intestinal microflora. Therapeutic archives – 2012. – 2: 5–10.
26. Romanova Iu. M, Ginzburg A. L. Bacterial biofilms as a natural form of existence of bacteria in the environment and host organism. Journal of microbiology, epidemiology and immunobiology – 2011. – 3: 99–109.
27. Pascual L. M., Daniele M. B., Ruiz F., Giordano W., Pájaro C., Barberis L. Lactobacillus rhamnosus L 60, a potential probiotic isolated from the human vagina. J Gen Appl Micribiol – 2008. – 54 (3): 141–148.

Section 3. Geography

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Forsings of ecosystems transformations in Priaralie

Abstract: Ecosystem transformations of Priaralie, which take place due to the sharp change of the water regime are diverse and numerous. The influence of salt aerosol from the post-aquatic dry land on the environment in Southern Priaralie is not restricted to soil salinity and degradation of vegetation.

Keywords: Priaralie, ecosystem transformations, salt aerosol, degradation, mathematical modeling.

Ecosystem transformations of Priaralie, which take place due to the sharp change of the water regime are diverse and numerous. In the conditions of development process of anthropogenic desertification the removal of salt from the desiccated bed of the Aral Sea is going on, degradation of vegetation is observed and the intensity of salt accumulation in the soil is increasing.

New shallow horizons of underground water with high capillary elevation of moisture and mineralization from 20 to 100 g/l are being formed on the desiccated bed. On termination of the second year of the Aral Sea bed desiccation the coastal zones have turned into plump alkali soils, dryness and flowability soil is increasing. At the same time the removal of salt on adjacent irrigated lands leads to considerable decline of crop productivity [6].

The influence of salt aerosol from the post-aquatic dry land on the environment in Southern Priaralie is not restricted to soil salinity and degradation of vegetation. As we know, the increase of aerosol concentration in the air influences the kinetics and dynamics of the atmosphere processes. The results of aerosol-radiation measurements [1], carried out in Priaralie in 1979–1982 over the sea and the desiccated territory during salt and sand removal showed considerable changes in distribution of radiation and hydrological balance ingredients of the «underlying surface — atmosphere» system. The given observations show that the cloudy nucleus of condensation contain, as a rule, of sulphates, which are prevailing fractions in mineral components of aerosol, removed from the desiccated bed of the Aral Sea by the wind.

The connection between the increase of the atmosphere pollution, and then the nucleus of condensation and reinforcement of cloud and sludge is testified by numerous investigations of aerosol and climatic effects, both natural and model [3]. Therefore we might speak of climatic-generation role of salt aerosol from post aquatic dry land of the Aral Sea.

The sharp decrease of the sea water area and degradation of vegetation make evident influence on the local climatic characteristics in Southern Priaralie. More over, the loss of the role of the main salt receiver by the Aral Sea led to progressing mineralization of underground water in the region, thus promoting the soil salinization. At the same time the degradation of vegetation leads to weakening of the effect of minerals removal from soil.

Thus, there is a system of transforming factors, which still influence the soil-climatic conditions of Southern Priaralie. It should be mentioned that it is necessary to demarcate the conceptions «the Aral Sea influence» and «the influence of the Aral Sea desiccation», because in the first case the factor is a geographical object, and in the second case — the process of ecosystem transformation, which as any ecological process, is a system of interrelated processes. In much the same way the effect of salt aerosol and the influence of post-aquatic dry land as the generator of salt removal differ from each other, and the influence of vegetation and the effect of degradation of vegetation respectively. Hence, the investigation of the Aral Sea desiccation influence on the environment assumes the study of the system process-factors with the aggregate of their interconnections. On this point of view concerning the effects of the Aral Sea crisis, we have a new systemic problem statement on quantitative assessment of soil-climatic conditions measurements in Priaralie depended on the ecosystem transformations. The influence degree assessment, the study of the dynamics of the running changes and the investigation of the dependence of influence results on the transformation factors degree is an absolutely interesting task both in scientific and practical plans. Solving of such a problem is possible only if there is a vast factual material and the many years observation data. Therefore the study of this problem became real only now, when a solid semi centennial basis of empirical knowledge was formed. On the other hand, the aggravation of the ecological problems of the Prearalie region connected with soil salinity and changes of the temperature and moisture regimes urgently necessitate the systemic study of these processes. Taking into consideration the prevalence of the agrarian sector in the Karakalpakstan economy, it should be admitted that the researches of this kind are very timely.

Great number of scientific works is dedicated to the study of some aspects of ecological changes and their influence on the environmental situation in Prearalie. Starting from the middle of

seventies the problem of aridization and salinity of Prearalie became the issues of detailed study by scientists of such scientific organizations as Scientific Research Institute of Hydrometeorology (SRIH) of Uzhydromet, KazSRIH, the Institute of Geography of the Russian Academy of Sciences (RAS), Karakalpak Branch of Uzbekistan Academy of Sciences and many other institutions.

The huge factual material, obtained by the scientists during 40 years of the Aral crises existence, makes it possible to refer the problem of salinization of soil to a well structured class of problems. The data obtained made it possible to discover on the territory of Southern Priaralie approximately 3,5–4 times bigger alkali soil area than on the territory of Kazakhstan [10]. The percentage of saline land in dry area is constantly increasing (from 3% in 1963 to 12% in 1990). Thus, detection of salt amount accumulated on post-aquatic dry land and its removal to adjacent territories remains to be one of the urgent and complex problems of geoecology of the present Aral. Investigations on climatic changes in Southern Priaralie are not so numerous and diverse as investigations on soil salinity, and mainly are of qualitative character. Firs of all great contribution of SRIH Uzhydromet scientists should be mentioned [4, 5, 11, 12]. Their works contain not only retrospective analysis of climatic changes in Priaralie but predictable assessments with the help of global models are given. The influence of sulfate aerosol is taken into consideration there.

In researches of climatic changes in Southern Priaralie, completed abroad [2], the Aral Sea desiccation is mainly regarded as a factor, only some works mention aerosol effect, and influence of vegetation transformation is not assessed at all. However, it should be mentioned there are a lot of works [3, 14–16] with the analysis of the factors, concerning climatic changes, completed for other regions or in the global scale. In the whole concerning the research of the Aral Sea problem we can mention that «outburst» of scientific inquiry on record in 70–80-ies of the last century, unfortunately, has been gradually decreased, and it is firs of all applied to expeditionary and natural surveys.

From currently available studies follows that though the problem of geoecosystem transformations of the Aral and Priaraliye and their influence on the environment is studied many-sided, only separate aspects of the problem are considered in each research. Not a bit derogating the value of the above mentioned works, as a result of which enormous scientific material is accumulated, it is necessary to acknowledge that only the systemic study of the influence of occurring transformations with their interconnected dynamics, allows displaying such an important characteristic of the system as the emergentism [13]. Let us give the elementary example. The Studies of one factor of the climatic change can show the increasing of summer temperature for 2 degrees, and independent studies of the other factor — a reduction for 2 degrees. The result of the studies in either event is a considerable change of the climate. The joint study of these factors, as a system will bring about zero result i. e. to motivated conclusion that no changes in climate occur. New characteristics of factors which were revealed under their system study are on hand. It is obvious that the results of the systemic study are closer to reality and give more complete idea about occurring changes. Thereby, the study of ecological transformation in Priaralie, as a system factor of environmental change seemed to be very actual.

Since natural potential is mostly defined by soil and climate condition, for such an agrarian region as Southern Priaralie, quantitative estimation and forecasting of the climatic change and the soil condition present extremely important and necessary information. In this connection we set a task to study with the help of the mathematical modeling methods the correlation of Priaraliya ecosystem dynamics and such processes as soil salinization and the change of local climatic features. Not pretending on the study of whole number of factor, causing these processes, we were limited to the most important ones — the desiccation of the Aral Sea, wind removal of salts from post-aquatic dry land and degradation of vegetation. Thereby, we have a system of three interconnected factors-processes, which influence upon the climate and soil salinity.

The mathematical modeling, being powerful and irreplaceable instrument of the ecological studies corresponds without any alternative to the purpose of this study. In the course of building of the models system, corresponding to the purpose of the study we came to conclusion that a big volume of data, both input and intermediate requires the organization of special database with architecture, adapted to the structure of the ecological model [9].

This considerably simplifies the procedure of the intensive information exchange between sub models in the course of the model realization. Besides, the abundance of operation, such as the adaptation of data of one sub model to the data of other sub models, the graphic output, integration and statistical processing of the results requires the buildings of special modules, usually included to the programs of each sub model.

The Highlighting of the specified functions and the database in separate, general for all sub models structure — the information-statistical block — provides the best consensus and format unity of the model in the whole.

Furthermore, at realization of the complex model, as a collection of separate programs, functioning in the interactive mode is inevitable; this consists in the control of the execution sequence of these programs and entering the data under variant calculations.

The control automation of the model realization course by building of a special controlling block and inclusion of data set for variant calculations into database raises the efficiency of the computing process and excludes the human factor to the limit. Thereby, we came to the idea of ecological macro model, according to which the model out of a simple collection of sub models is transformed into the system with infrastructure, which consists of the information-statistical (ISB) and controlling block (CB). As a result sub models turn out to be bound not only logically, but also technologically i. e. the system relationships get its clear expression and embodiment in infrastructure.

Thereby, we modified traditional technology of modeling of the complex processes by buildings of the model complex, named by us macro model so that to distinguish from usual systems of the models. The macro model designed by us is a hierarchical system, the elements of which are information-statistical block, control block and model blocks. The Control block (CB) is essentially a program of realization macroalgorythm of the models system. Information-statistical block (ISB), the base of which is the database, serves for processing input, intermediate and output models. The Model blocks are complex models, consisting of several sub models, mainly numerical.

The Model 1 first of all, allows to conduct the calculations of the change of saltiness, the water level and configuration of coastal line of the Aral Sea (the submodel SEA). Secondly, in model 1, zones of influence on temperature and moisture fields are defined (the submodel ZONE) i. e. parameters of three-dimensional space, in which deflections of specified climatic features are not less than previously set points (accuracy). In submodels SDB (salinization of dried bottom) the amount of the salts remaining on drained bed as a result of the sea regression is calculated.

The Purpose to models 2 — is a description of the saline soil formation and dynamics on the desiccated bed (the submodels WATER and SALT), as well as salinization of soil outside of post-aquatic

dry land as a result of infiltration of the sulfate aerosol fall with precipitation or during irrigation (the submodel INFILTR).

In models 3 the calculation of salt transfer is presented (the submodel SALTTR). Then in submodels RAD the level of the atmosphere temperature regime change under the influence of saline aerosol is calculated [8].

The Model 4 describes the influence of vegetable layer on the temperature and moisture of the air. The Submodel GROUND presents the equation of heat conductivity in the ground. The Transformation heat and moisture flow in vegetation layer and their importance on the upper border of vegetation layer are defined in balance submodel VEGETA. Vertical diffusion of heat and moisture flows in the atmosphere are calculated in the numerical submodel AIRTR and PRSA. Dependence of soil salinization on projective covering of vegetation layer is assessed in model [7].

When initializing the work of macromodel in the module DATASCENARIES of the information-statistical block scenarios of input data for each submodel (the specially organized external information)are formed. Output data of all models are entered in ISB, on soil salinity — in module SALINE, on climatic change — in module CLIMATE, where they are organized in an integrated format then are sent to Results for generalizing statistical processing and cartographic work.

In the course of study the dynamics of influence of changing factors on the climatic characteristics and soil salinization during four decades (1966–2005) was traced. On the basis of the obtained results for this retrospective period, the main trends were revealed and scenarios for the forecast calculations for 2030 were made.

Thus, the use of the macromodels has allowed quantitative assessment of this forcing, reveal the appropriateness of its dynamics, both on years, and more detailed — on seasons, months and decades, as well as forecast the development of the process in the future.

The results obtained indicative the essential influence of the considered factors on the temperature and relative moisture of the air, the amount and mineralization of precipitation, as well as on salinization of soil. The important role of the vegetable cover in desalinization of soil is revealed in particular [7–9].

We shall bring the main results of the conducted study.

1. Emergentism of systems factor reveals itself in the fact that the dynamics of the joint influence of forcings, because of their difference in signs, loses its monotony, possesses the greater rates of change compared with the dynamics of influence separately and in the course of time can change the sign of the influence i. e. make the qualitative jump.

2. The amount of salt remaining on the soil surface, as a result of the sea regression, increased from 12 t/h in 1973 to 148 t/h in 2005.

3. Infiltration with the precipitations of the saline aerosol, removed from the desiccated bottom of the Aral Sea by wind in 2005, increased the soil salinization by 0,5%.

4. Average annual increase of precipitations mineralization by saline aerosol is equal to 50 mg/dm$^{3.}$

5. Salt aerosol at concentration up to 400 mkg/m3 on the condensed level leads to increase of precipitations, in some cases their realization by 1,6 mm, at a higher concentrations the aerosol effect changes for the opposite — the precipitations do not fall, and thereby, the lifetime of clouds increase, i. e. duration of cloudiness.

6. Salt aerosol brings down the temperature by 2–3 °C.

7. Vegetation lowers the temperature of the air at the average by 1–2 degrees as a result of the energy consumption on evapotranspiration and a smaller coefficient in contrast with ground heat exchange with the external ambience. The degree of reduction of the air temperature by vegetation depends mainly on its projecting cover (by 70–80%). The change the air temperature by vegetation cover to 0,01 degrees spreads up till significant height (2000 m for 100% for the projecting cover).

8. The vegetable layer increases the relative moisture of the air due to evapotranspiration at an average by 0,8%; the level of the air moisture increase depends mainly on the projective cover of the vegetation; the dependence of transpirational coefficient does not exceed 20%; the change of the air moisture by vegetation cover to 0,1% spreads at an average up to 800 m.

9. The softening influence of the Aral Sea on the Priaralie climate is steadily decreasing and the reduction of relative moisture by 0,18–0,3% per year is going on and increasing of the air temperature by 0,05–0,2 ° C per annum consequently.

10. The extent of Aral Sea zone influence on the temperature and relative moisture of air decreased monotonously from 300 km in 1966 to 30 km in 2008.

11. The influence of salt removal by the wind on the climate is expressed in reduction of the temperature of the air by 0,07–0,1 ° C per annum, as well as in increase of mineralization on 10–30 mg/dm3 and rainfall on 0,2–0,3 мм per annum.

12. The total influence of factors on reduction of relative moisture and increasing of the air temperature make up 0,04–0,3% per annum and from 0,03 to 0,11 ° C per annum accordingly.

The analysis and comparison of the results of the macromodel numerical realization in the whole and submodels to the pictures with ISZ, observed data and model calculation of the other authors allows to draw a conclusion about the adequacy of the designed models and the correspondence of the calculations obtained with the reality data.

Thus, the macromodeling, applied in a given study, has allowed get tinga new impression on the role of ecosystem transformations taking place in Priaralie. The main ecological problems of the region — salinization of soil and climatic changes are considered in a new perspective, as effect of the system transformation of geobiocenoses. We made sure that the desiccation of the Aral Sea and its consequences, as wind removal of salts and degradation of vegetation lead to considerable changes of atmosphere and soil condition.

References:

1. Binenko V. I., Ivanov V. A., Lebedinov V. G. – Aerosolno-radiatsionnye izmereniya v Priaralie//Trudy GGO, – 1982. – V. 462, – 37–43.
2. Vager B. G., Utina Z. M. – Modelirovanie vliyaniya Aralskogo moray na protsessy vlagoperenosa v pogranichnom sloe atmosfery.//Trudy GGO, – 1982, – V. 468, – 56–65.
3. Kondrat'ev K.Ya. Klimat i aerosol.//Leningrad, Gidrometeoizdat, – 1991. – P. 541.
4. Skripnikova L. E., Spektorman T.Yu. Ob otsenke klimaticheskikh izmenenii prizemnoi temperatury vozdukha Srednei Azii//Trudy SANIGMI, – 1998, – V. 156 (237), – P. 115–121.
5. Spektorman T.Yu., Nikulina S. P. Stsenarii vozmojnykh izmenenii klimata Uzbekistana i prilegayuschei gornoi territorii na osnove vykhodnykh rezul'tatov modelei obschei tsirkulyatsii. Informatsiya ob ispolnenii Uzbekistanom svoikh obyazatel'stv po Ramochnoi Konventsii OON ob izmenenii klimata.//Bulleten No 1, – Tashkent: SANIGMI, – 1999, – P. 41–53.

6. Tajimuratov P., Pirjanova R., Seytniyazova B. Izmeneniya fitotsenoza primorskoi polosy Ustyurta pri aridizatsii//Tezisy dokladov Respublikanskoi konferentsii Izuchenie ekologicheskikh problem Priaralya. Nukus: Bilim, – 2005, – P. 3–4.
7. Tleumuratova B. S., Bakhiev A. Vliyanie degradatsii rastitel'nosti v Priarale na lokal'nye klimaticheskie kharakteristiki.//Problemy osvoeniya pustyn', – 2008, – No 2, – P. 35–39.
8. Tleumuratova B. S. Sistemnyi analiz v matematicheskom modelirovanii//Vestnik KKO AN RUz, – 2008, – No 3, – P. 5–8.
9. Tleumuratova B. S. Vliyanie solepyleperenosa na osadkoobrazovanie v Priaral'e//Aridnye ekosistemy, – 2009, – V. 15, – No 3 (39), – P. 28–35.
10. Tolkacheva G. A. Nauchno-metodicheskie osnovy monitoringa atmosfernykh vypadenii v Sredneaziatskom regione//Tashkent, – 2000, – 204 p.
11. Chub V. E. Izmenenie klimata I ego vliyanie na prirodno-resursnyi potentsial Respubliki Uzbekistan//Tashkent: SANIGMI, – 2000, – 252 p.
12. Chub V. E., Cnanysheva S. G., Nikulina S. P., Spektorman T.Yu., Subbotina O. I. Razrabotka regional'nykh klimaticheskikh tsenariev. Informatsiya ob ispolnenii Uzbekistanom svoikh obyazatel'stv po Ramochnoi Konventsii OON ob izmenenii klimata.//Bulleten № 1, Tashkent: SANIGMI, – 1999, – P. 5–14.
13. Eshbi U. P. Vvedenie v kibernetiku.//Moskva: IL, – 1959, – 157 p.
14. Andreae, M. O. Climatic effects of changing atmospheric aerosol levels//World Survey of Climatology. – 1995. – Vol. 16. – P. 341–392.
15. Nakajima T., Higurashi A., Kawamoto K., and Penner J. E., A possible correlation between satellite-derived cloud and aerosol microphysical parameters.//Geophys. Res. Lett. – 2001. – No 5. – P. 1114–1135.
16. Tegen I., Holling P., Chin M., Fung I., Jacob D. and Penner J. Contribution of different aerosol species to the global aerosol extiction optical thickness: Estimates from model results.//J. Geophys.Res. –1997. – 102 (20). – P. 23895 –23915.
17. Wu J., J. Liu, D. E. Jelinski. Effects of leaf profiles and canopy stratification on simulated energy fluxes: the problem of vertical spatial scale//Ecol. Modelling. – 2000. – V. 134. – P. 283–297.

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Assessment of the development level of railways in economic and geographical areas of Uzbekistan

Abstract: In this article, the development level of rail transport and the factors influencing its development have been examined, and research proposals and recommendations to address existing disparities in socio-economic development in the economic and geographical areas have been developed.

Keywords: economic-geographical area, rail transport, infrastructure, supply, length, density, cargo transportation, passenger transportation, disparities.

Introduction. Sustainable economic development, the formation of a unified socio-economic area, the improvement of the territorial structure of the productive forces in our country largely depends on the advanced development of transport infrastructure [1], including rail transport, since the conveyance cost of goods and passengers on rail transport, compared with other modes of transport, is significantly lower. In particular, the cost value of freight by rail is 3-5 times cheaper than road transport, 12-15 times – on air transport [2]. The structure of the rail transport and its infrastructure includes linear and nodal elements, locomotives and wagons, but railway transportation is divided into goods and passenger transportation [3].

Goals and objectives. The main purpose of this study is to investigate the development level of railway transport under the conditions of modernization of the economy by the example of the economic and geographical areas of Uzbekistan, the development of proposals and recommendations to address existing disparities in socio-economic development among the economic and geographical areas. Based on the set goals, the following tasks were performed: the length and density of railways on economic and geographical areas were explored; the dynamics of the conveyance of goods and passengers was analyzed; as well as the disparities between the economic and geographical areas were identified; scientific recommendations and proposals to improve railway transport was developed. The study used the methods of geographical, comparative analysis, statistical, mathematical and historical methods.

Main part. All the economic and geographic areas of Uzbekistan (hereinafter EGA) are covered by rail transport. For the years of independence constructed, railway lines as Navoi-Nukus-Uchkuduk-Sultanuizdag and Tashguzar-Boysun-Kumkurgan are of great importance. In 2016, the railway with the length of 124 km was introduced into operation. Angren-Pap, connecting the Fergana valley with the other territory of Uzbekistan, can be regarded as the final stage of the formation of a country's unified transport network [4]. It should be emphasized that all of them have both meridional and latitudinal directions.

In 2015, the length of railways for general use made up 4,237.5 km. and for the period 1991-2015, this figure had increased by 120.0%. Mean density indicators of railways for 10,000 km^2 made up 94.4 km/km^2 [5]. This figure is much lower than the ones of developed countries. In particular, the railway density is 9 times lower than in Japan, 12.5 times – Germany [6].

As studies show, there are significant disparities on the length and density of the railways between the EGA. Along the length of the railways, Zarafshan (24.1%) and lower Amu Darya (23.2%) are leaders, EGA (Table 1).

Table 1. – Indicators of the railway transport development in Uzbekistan and EGA (2015)

Economic-geographical areas:	The length of railways		The density of railways, 10000 km²/km	Freight		Transportation of passengers	
	km	%		thousand, ton	%	thousand, per.	%
Uzbekistan	**4237,5**	**100,0**	**94,4**	**67209,9**	**100,0**	**20125,5**	**100,0**
Tashkent	364,4	8,6	23,3	20423,0	30,4	10983,0	54,6
Ferghana	564,7	13,4	30,5	8487,7	12,6	785,0	3,9
Zarafshan	1022,2	24,1	6,1	23580,1	35,1	830,6	4,1
Southern	861,4	20,3	17,7	7710,5	11,5	1035,1	5,1
Mirzachul	441,6	10,4	17,3	4408,2	6,5	5496,3	27,3
Lower Amu Darya	983,0	23,2	5,7	2600,4	3,9	995,5	4,9

Table was done by the author on the basis of statistical data of the State Statistics Committee of Uzbekistan.

In addition, Southern EGA has a relatively large extent indicators of railways (20.3%). Fergana and Mirzachul EGA constitute for 13.4% and 10.4% respectively the proportion of Tashkent EGA is less than 10%. Over the past 15 years, the length of railways in the lower Amu Darya EGA increased by 155.5% , in the Southern EGA-by 126.5%. Also, in the Zarafshan and Mirzachul EGA the length of railways increased by 116.1% and 113.4% respectively. During the analyzed period (2000-2015) the length of railways in the Fergana EGA increased by only 7.7%.

Figures for density of railways on EGA have different levels, which is having an impact on the social and economic development of each EGA. The biggest indicator of the density of railways among the EGA is the Ferghana EGA, accounting for 30.5 km / km². Besides, Tashkent EGA (23.3 km/km²) also has great proportions. The lowest rates of density of railways were seen in the Zarafshan (6.1 km / km²) and the lower Amu Darya EGA (5.7 km/km²). In the Southern and Mirzachul EGA, the density of railways is relatively high (17,7–17,3 km/km²). A high level of density of railways in the Ferghana and Tashkent EGA can be explained by the small data area of EGA, and vice versa the low density of railways in the Zarafshan and lower Amu Darya EGA is due to the presence of a large area in EGA.

Analysis of the goods conveyance in EGA show that by the conclusions of 2015 more than a third of transported goods (35.1%) accounted for Zarafshan EGA (Table 1). In addition, the Tashkent EGA has 30.4% of transported goods, the proportions in the Fergana and Southern EGA are respectively 12.6% and 11.5%. The quantity of Mirzachul and lower Amu Darya EGA together makes up just over 10%. The high level of freight in the Zarafshan and Tashkent EGA is due to the high level of industrial development and overall the socio-economic level of these EGAs.

In 2015, 20,125.5 thousand passengers, more than 54% of passengers, accounted for the Tashkent EGA, were totally transported by the railway transport. The proportion of the Mirzachul EGA accounts for 27% of passengers. The proportion of the other EGAs in the transportation of passengers is relatively low. This fact is explained by the high social and economic level of the Tashkent EGA, as well as the beneficial economic and geographical position of this EGA, which is a kind of "gateway" of foreign economic relations of the whole country.

Over the period from 2005 to 2015, passenger transportation by rail in Uzbekistan increased and made up 133.0%. In the Mirzachul EGA, there was a 3.8 times increase. In the Tashkent and Ferghana EGA, the increase in the transportation of passengers constituted for 131.2% -165.8% respectively. The increase in the rate of passenger growth in these areas was due to the quality improvement in this area, as well as this form of transport has become more competitive in the price than road transport.

Conclusion. In conclusion, it can be said that the emergence of disparities in terms of extent and density of railways, the transportation of goods and passengers in the context of EGA is due to the influence of natural and geographical, transport and geographic and socio-economic factors such as the area, with the advantageous or disadvantageous transport and geographical location, as well as the level of industrial development and socio-economic development of the EGA data. It should be emphasized that the impact of natural and geographical factors is impossible to overcome, the transport and geographical location and socio-economic development can be improved. On this basis of this, the elimination of disparities in the development of EGA, the improvement of railway infrastructure should be implemented taking into account the effect of the above factors.

On the basis of the investigations, in the context of EGA, we offer the realization of the following problems and solutions:

- the construction of new railway lines in the EGA, connecting with international highways, which allows to access a go to the neighboring countries. This approach allows to improve transport and geographical position of EGA, which in turn will form the basis for sustainable socio-economic development of EGA;

– in EGA with a small and relatively small occupied territory, it is appropriate to consider the development of small and medium industry enterprises, which does not require the transportation of bulk goods over long distances;

– in EGA with a large occupied area, it is appropriate to increase the length and density of railways, to develop the construction of large enterprises and growth points.

References:

1. Якунин В. К вопросу о бюджетном инвестировании в транспортные инфраструктуры общего пользования. – М.: Центр проблемного анализа и государственно-управленческого проектирования, – 2006 г.
2. Ульджабаев К.У. Экономическая реформа на железнодорожном транспорте. Монография, изд. «Мехнат», – Ташкент, – 1999. – С. 11.
3. Социально-экономическая география: понятия и термины**.** Словарь-справочник. Отв. ред. А.П. Горкин. – Смоленск: Ойкумена, – 2013. – 96 с.
4. URL: http: www.press-service.uz.
5. Transport and communications in Uzbekistan, – 2015. Statistical Yearbook, – Tashkent, – 2016.
6. World Development Report – 2007.

Section 4. History and archaeology

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Impact of Cuban Missile Crisis on US foreign policy

Abstract: The influence of the Cuban Missile Crisis on U.S. foreign policy from 1989 to 2000 has been examined and the major events that occurred during this period have been analyzed.

Keywords: Cuban Missile Crisis, diplomacy, Russian-American relations, the Cold War, democracy.

The Cuban Missile Crisis is an international conflict situation, which is caused by the placement of Russian missiles in Cuba that have the average effective range. Humanity absolutely felt the reality of the Apocalypse. Fortunately, the common sense has gain on the upper hand over the emotions that have played out, and recklessness. Political figures from the USSR, USA and Cuba for the first time realized it was "nuclear stalemate", and thus showed the desired realism in liquidation of crisis situations, found within themselves the strength to embark on the road to tackle the most urgent international task not by military, but by diplomatic means. And It is not too much to say that the lessons of the Crisis, that warn against hasty, thoughtless actions, were a harsh investment in new thinking, developed new layouts to the events on the world stage.

The Cuban Missile Crisis had extremely important, far-reaching results for the formation of international relations. US foreign policy played a tremendous role in international relations.

On the background of diverse and often contradictory directions in American political and academic elite in the 1990s, the foreign policy has been forming. Its purpose, as well as the purpose of any county's foreign policy, was to develop a rational foreign policy, which helped to maintain the dominant position in the world, thus avoiding any needless overspend of internal resources of the nation, its "Imperial overstretch". In fact, two trends – to the activism of foreign policy and isolationism, occurred at the same time, and interconnected – one day as parallel, the other as intersecting, adjoining, diverging and re-converging.

Foreign policy has long been used as a testing ground for the achievement of superiority between the major powers. Within 1989-2000 United States made a bet on the informational component as a method of achieving the desired policy objectives. George Bush Senior came up with the doctrine of "Liberation", which purpose was to destroy the Soviet Union [1].

In 1990 the US and Russia came to an agreement on reducing military confrontation in Europe and in 1991 – on reduction of strategic offensive arms. The Soviet Union withdrew its troops from Afghanistan and supported firm action against Iraq, which invaded Kuwait. The collapse of the Soviet Union has temporarily transformed the USA into a superpower that was able to settle the fate of the world [5].

In the 1990s US foreign policy had to face several crises. The role of Americans in the work of the multinational UN forces for peacekeeping in Somalia in 1992-1993 ended with complete failure. Serious losses in battles with local militants and the reluctance to intervene in the civil war forced the US to withdraw its troops from African countries.

In the 1990s America's leaders reacted to the warnings of the isolationists. So, in early August 1990, President George Bush predicted the collapse of the bipolar world and appointed not only the need for the formation of new global strategies, but the concomitant creation of a hierarchy of supporters, regions, and policy objects according to their degree of importance to the United States. In order not to throw resources in places where the results of the regional struggle are not important for America's interests. George Bush started to point to his administration the priority of internal tasks, although inactive and visually for the nation of America. In the presidential address of 1992 "State of the Union" it was also suggested [2]: "We can now stop making those sacrifices that we made in the confrontation with the aggressive superpower".

This trend has gained more significant development in the policies of subsequent US President Clinton. The election campaign of the Democratic party, where Clinton was the candidate, beating Bush in the presidential election in early November 1992, focused, before all, on America's internal problems. While Clinton was the President, for the first time in the postwar situation, the United States has made it plain that US are not able to solve major problems alone. This statement made clear that there is a clear presence of neo-isolationism component of the mechanism in the foreign policy of the democratic administration.

Neo-isolationism mood was manifested in the fact that the United States tried to withdraw from participation in solving of a number of international tasks. So, almost at the end of winter 1993 Deputy Secretary of State for political tasks Tarnow declared that "the United States are not going to meddle in Bosnian Affairs, as in other incidents, after the Cold War ended "just because we have no money".

In parallel with the orientation towards isolationism in America's foreign policy, the trend interventionism is constantly present in foreign policy. Already in his first presidential address "State of the Union" Bill Clinton promised to reduce more military spending of America.

In 1994 the United States proposed the strategy of national security. It supported the armed forces that meet the threats in the context of the Cuban Missile Crisis and the Cold War. Fixing the American economy through providing access to new foreign

markets and globalization. The United States decided to play the role where they will be the only superpower, and became the guarantor of international security and americentric system of international law: less UN, than USA [4, P. 12–13].

In 1995, the report of the Ministry of Defense gave confirmation of the plan to preserve the armed forces as well as military obligations, but in some certain cases, to expand them. In 1995, President Clinton agreed with the Republican Congress on a gradual increase in military spending.

Interestingly, after the victory was won by Republicans in 1994 congressional elections, members of Congress, that were member of the Republican and Democratic parties, found a common language on the issue of cuts in foreign policy costs of US. Liberal Democrats and conservative Republicans rallied well in their positions of neo-isolationism and began to repel the Clinton administration in conducting an intensive international policy. In response, Secretary of State Christopher announced that a substantial reduction in foreign costs "will damage our national interests and the opportunity to be a leader". Leaving his post, the United States Secretary of State Christopher considered it was his duty to warn the American civilization about the threat of "new isolationism": "We face the danger of new forms of isolationism, in which the United States is the requirement of its leadership, but also its deprivation of the possibility to play a Central role" [7, P. 224].

Continuation of antisocialists method was manifested in the presidential address of 1999 "State of the Union" [3]. In it, President Clinton announced an increase in military budget – the largest increase after the Cuban Missile Crisis and the Cold War. By the end of 1990s, activism has become not only more visible, but the dominant focus in American foreign policy.

In general, American politicians and experts believe that if the XIX century was the century of balance of power in the world, then the XXI century will be the century of the decisive imbalance in favor of America. The US strategy in the XXI century includes the following [8].

1. To preserve leading large-scale position of the country, to strengthen the main participant in the technological revolution, which controls forces in the North Atlantic and East Asia.

2. To avoid uncontrolled opponent, capable of becoming major competitor in the mid-century, and build a new world in which for the first time in five hundred years the West would not be major power.

This way, during the 1990s, Washington administration solved the problem of the selection of foreign policy between neo-isolationism and activism. The key focus of the progressive foreign policy of the United States has the deepest historical roots, as evidenced by the political experience of the country in the XIX–XX centuries. Both foreign policy directions have their pros and cons, and the actual foreign policy of the White House usually becomes the "middle" epitome, a synthesis of them both. It is possible to imagine that these directions shall collide, intertwine and complement each other in US foreign policy in the XXI century [6, P. 22].

It is alarmingly then that armed intervention in the internal incidents that erupt in other states became a common thing for USA. Does this meet the long-term interests of the United States? I doubt it. Millions of people around the world regularly refer to USA not as a model of democracy, but as a country that relies only on brute force, cobbling together coalitions under the motto "you're either with us, or against us".

US foreign policy is regularly criticized as a source of inconstancy in some regions of interests of the United States. In particular, the US role in "color revolutions" around the world, supporting opposition and non-profit organizations that are loyal to USA through the funds, the execution of municipal coups. According to any observers, the United States thinks of a major rule and creation of a unipolar world that is absolutely executed by the American politicians the last decade.

US foreign policy focuses generally on the security solutions due to feelings of own military advantage and neglect the interests of other states. It also suffers due to senior diplomatic managers who have low professionalism.

In our opinion, the Cuban Missile Crisis was the same bitter but necessary lesson for the population of the Earth as were Hiroshima and Nagasaki. In those cases, tens of thousands were killed, but the whole world realized the nightmare of a nuclear disaster, and their destruction saved millions in the future.

The Cuban Missile Crisis has been overcome not by military, but by diplomatic means. Saving of formal and informal contacts between the two states, especially during the recent tensions, the political will to engage in vigorous dialogue, endurance, ability to hear the other side and go to a real compromise – this was of considerable importance and did not let the Cold War turn nuclear. The subsequent situation of Soviet-American relations clearly confirmed it.

Though the possibility of recurrence of a similar crisis in relations between Russia and America in modern conditions is very high, these lessons have a chance to be needed in the other possible nuclear incidents in the XXI century.

References:

1. Levesque, Jacques. The Enigma of – 1989: The USSR and the Liberation of Eastern Europe. Berkeley: University of California Press, – 1997. URL: http://ark.cdlib.org/ark:/13030/ft4q2nb3h6/
2. US President address of – 1992 "State of the Union" URL: http://millercenter.org/president/bush/speeches/speech-5531
3. US President address of 1999 "State of the Union" URL: http://www.washingtonpost.com/wp-srv/politics/special/states/docs/sou99.htm
4. Bush, George H.W.; Scowcroft, Brent. A World Transformed. – Moscow, – 2004. – 154 p.
5. Kissinger, H. Diplomacy. – Moscow, – 1997. – 733 p.
6. Garusova L.N. US Foreign Policy: Major Trends and Directions (1990-2000). – 153 p.
7. Utkin A.I. American Strategy for the XXI Century: The Manual / under. ed. of Utkin A.I. – Moscow: Moscow, – 2013. – 328 p.
8. The Heritage Foundation // USA: Economics, Politics, Ideology. – 1992. – No. 7. – 28 p.

Section 5. Information technology

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Mathematical modeling of geofiltrational of processes of the regional hydrogeological systems

Abstract: In the article has considered a wide range of subjects from computer modeling to experience with water user associations and vary in content from directly applicable research to more basic studies, on which applied work ultimately depends on the example of the Ferghana Valley. Some researchers are narrowly focused, applied and detailed empirical studies; others are wide-ranging and overviews of generic problems.

Keywords: Mathematical modeling, geofiltrational of processes, boundary conditions, manage aquifer recharge, estimation an optimal regime, groundwater extraction, groundwater for irrigation.

Study Area. The Fergana Valley depression is the area spread between the mountains of Kuramin and Chatkal on the north, Atoinak and Fergana on the east, and Alai and Turkestan on the south (Lange 1964). The Fergana Valley covers a central part of the depression bounded by the outcrops of the Mesozoic and Paleozoic formations. This study is limited to the part of the Fergana Valley within Uzbekistan with an area of 17,000 km$^{2.}$ The irrigated area totals to 897,000 ha. The climate is semi-arid with low quantity of precipitation and high summer temperatures. The annual precipitation rate varies from 100 to 200 mm in the central part of the valley and increases to 300 mm in the piedmont areas. The mean average temperature is at 14 °C. The altitude increases from west to east from 330 meters above sealevel (masl) to 600 masl. The valley is filled with alluvial deposits of rivers washed out in the mountain zone. Mirzaev (1974) specified three hydrogeological zones in the Fergana Valley: (1) groundwater natural recharge and transit (Zone A); (2) spring (Zone B); and (3) groundwater dispersion (Zone C) (see Figure 1). By source of supply, the rivers of the Fergana Valley are glacier- and glacier-snow type. The Karadarya and Narin Rivers and its tributaries are of snow glacier type.

Sources available for managed aquifer recharge (MAR) are (1) free winter flow of small rivers; (2) the flow of small rivers, which can be released by the adoption of water-saving technologies or increasing groundwater irrigation; (3) precipitation in Zone A (see Figure 1); (4) subsurface inflow from the upstream; and (5) the winter flow of the Naryn River. Winter flow of small rivers can be used for increasing natural recharge in Zone A, which spread above the main canal commands. Natural recharge can be enhanced by increasing the leakage from the riverbed and the floodplain, canal and stream channels. The winter flow of the Naryn River can be stored underground by: a) increasing the leakage from the canals; b) installing infiltration basins; and c) boreholes or shafts. Sources available for MAR are (1) free winter flow of small rivers; (2) the flow of small rivers, which can be released by the adoption of water-saving technologies or increasing groundwater irrigation; (3) precipitation in Zone A; (4) subsurface inflow from the upstream; and (5) the winter flow of the Naryn River. Winter flow of small rivers can be used for increasing natural recharge in Zone A, which spread above the main canal commands. Natural recharge can be enhanced by increasing the leakage from the riverbed and the floodplain, canal and stream channels. The winter flow of the Naryn River can be stored underground by: a) increasing the leakage from the canals; b) installing infiltration basins; and c) boreholes or shafts.

As a result of the growing demand for food and energy, the competition for water between upstream and downstream users in the Syrdarya River Basin has increased. The change in the upstream reservoir operation from a conjunctive irrigation/hydropower mode to exclusively hydropower generation resulted in reducing the river flow downstream in the summer and increasing it in the winter.

Modeling studies for the estimation an optimal regime of groundwater extraction, which would facilitate the prevention of freshwater and saline water mixing, and thereby maintain the water quality in the lenses at the supply level that is acceptable for drinking purposes until the next high water season.

Used a mathematical model based on a system of differential equations describing the time-dependent planned flows of groundwater in the interconnected aquifers of parabolic type, having the following form (Habibullaev et al, 1995):

$$\mu\frac{\partial h}{\partial t}=\frac{\partial}{\partial x}\left(kh\frac{\partial h}{\partial x}\right)+\frac{\partial}{\partial y}\left(kh\frac{\partial h}{\partial y}\right)+f-\delta Q_w \qquad (1)$$

with the initial conditions,

$$h(x,y,t_0)=\varphi_1(x,y,t0);\ (x,y)\in G;\ t_0=0 \qquad (2)$$

and with the boundary conditions,

$$h(x,y,t)=\varphi_2(x,y,t);\ (x,y)\in\Gamma;\ t>t_0 \qquad (3)$$

$$-kh\frac{\partial h}{\partial n}=\phi_3(x,y,t)\ \ x,y\in\Gamma;\ t>t_0; \qquad (4)$$

$$-kh\frac{\partial h}{\partial n}=\gamma(h_r-h),\ x,y\in\Gamma;\ t>t_0; \qquad (5)$$

where, μ — water loss rate of the aquifer (dimensionless), $h=h\ (x, y, t)$ — groundwater level of water level to the free surface, m; $(x,y)\in G$ — filtering domain — G, with boundary — Γ; x, y –spatial

and t –temporal coordinates; k — filtration coefficient, m/day; $f(x, y, t)=Q_r-Q_c-Q_p$ — infiltration feeding of ground water, the sum of the parts of rainfall and irrigation water (filtration of r — river c — channels), percolating into the aquifer, p — evaporation from the groundwater level; $Q_w=Q(t)\delta(x-x_0, y-y_0)$ $t>t_0$; δ — Dirac function; φ_1, φ_2, φ_3 — given functions; γ –characterizes the hydrogeological conditions of the relationship underground and surface waters;

Decisions of the equation (1) with the boundary conditions (2) — (5) used a numerical method (AA. Samarskiy 1983), the transition from differential to record the difference method.

Then the equation (1) takes the following form:

$$\frac{h_{i,j}-\bar{h}_{i,j}}{0.5\Delta\tau}l=\Lambda_{i-0.5,j}-\Lambda_{i+0.5,j}+\Lambda_{i,j+0.5}+\left(W_{IIi,j}-W_{Oi,j}\right)l \quad (6)$$

where, $\Lambda_{i-0.5,j}=-(kh)_{i-0.5,j}\frac{h_{i,j}-h_{i-1,j}}{l}$, $\Lambda_{i+0.5,j}=-(kh)_{i+0.5,j}\frac{h_{i+1,j}-h_{i,j}}{l}$, $\bar{h}_{i,j}=h_{i,j}^{k+1}$.

After some transformations we obtain a standard equation

$$a_{i,j}h_{i-1,j}-b_{i,j}h_{i,j}-c_{i,j}h_{i+1,j}=-d_{i,j} \quad (7)$$

For the solution of this equation using the method of so-called locally — dimensional circuitry solutions, (A. A. Samarsky, 1983) sweep method and a solution will be sought in the form $h_{i,j}=\alpha_{i+1,j}h_{i+1,j}+\beta_{i+1,j}$, where, $\alpha_{i+1,j}=\frac{c_{i,j}}{b_{i,j}-a_{i,j}\alpha_{i,j}}$; $\beta_{i+1,j}=\frac{d_{i,j}+a_{i,j}\beta_{i,j}}{b_{i,j}-a_{i,j}\alpha_{i,j}}$, and we obtain the equation for hi, j, in the case of boundary conditions of type I,

$$\alpha_{1,j}=o;\ \beta_{1,j}=\psi_{1,j} \text{ here } h_{1,j}=\psi_{1,j},$$
$$\alpha_{N,j}=o;\ \beta_{N,j}=\psi_{N,j} \text{ here } h_{N,j}=\psi_{N,j}, \quad (7)$$

in the case of boundary conditions of type II,

$$\alpha_{1,j}=\frac{a_{0,j}}{\gamma+a_{0,j}};\qquad \beta_{1,j}=\frac{\gamma\bar{h}_{0,j}+Q}{\gamma+a_{0,j}}$$
$$\alpha_{N,j}=\frac{a_{N,j}}{\gamma+a_{N,j}};\beta_{N,j}=\frac{\gamma\bar{h}_{N,j}+Q_j+S_y}{\gamma+a_{N,j}},$$
$$\text{here } h_{N,j}=\frac{a_{N,j}\beta_{N,j}+\gamma\bar{h}_{N,j}+Q_j+S_y}{\gamma+a_{N,j}+a_{N,j}\alpha_{N,j}}; \quad (8)$$

in the case of boundary conditions of type III,

$$\alpha_{1,j}=\frac{a_{0,j}}{\bar{\gamma}+\gamma+a_{0,j}};\qquad \beta_{1,j}=\frac{\gamma\bar{h}_{0,j}-\gamma h_B+Q}{\bar{\gamma}+\gamma+a_{0,j}}$$
$$\alpha_{N,j}=\frac{a_{N,j}}{\bar{\gamma}+\gamma+a_{N,j}};\beta_{N,j}=\frac{\bar{\gamma}\bar{h}_{N,j}+\gamma h_B+Q}{\bar{\gamma}+\gamma+a_{N,j}}$$
$$\text{here } h_{N,j}=\frac{a_{N,j}\beta_{N,j}+\bar{\gamma}\bar{h}_{N,j}+\gamma h_B+Q}{\bar{\gamma}+\gamma+a_{N,j}+a_{N,j}\beta_{N,j}}; \quad (9)$$

Thus, all the coefficient values $\alpha_{N,j}, \beta_{N,j}$ are computed, and $h_{i,j}$. As an initial approximation we accept the initial condition of the boundary value problem (9) sequentially calculate $h_{i,j-1,r+1}^{s+1}, h_{i,j-2,r+2}^{s+1},\ldots, h_{i,j-m,r+m}^{s+1}$ and will check the condition $\max_{i,j\in\omega_h}\left|h_{i,j,r}^{s+1}-h_{i,j,r}^{s}\right|\le\varepsilon,\quad \varepsilon>0$ If the condition is satisfied, the calculation is terminated, otherwise the entire calculation process is repeated for the next iteration. The values of the mesh function satisfying the condition, used as problem solving.

Developed the software to implement such an approach, focused on solving routine and specialized tasks geofiltration presumably includes blocks that implement algorithms for solving boundary value problems for groundwater flows.

Model Description. A three-dimensional regional model of the Fergana valley aquifer (Figure 2) is a widely used GIS-technology. The Fergana aquifer model covers approximately 380 km^2. Grid spacing in the x and y model dimension is 250 m × 250 m, and in the areas with dense irrigation canals and drainage ditches the model has 50 m × × 50 m resolution.

The model boundary conditions were set based on the results of the hydrogeological studies carried out by the HYDROENGEO. The surface of the groundwater level acted as a recharge boundary. The loamy/clay layer that is 300 m deep was set as a noflow boundary to represent the lower boundary condition. In the south, there is the subsurface inflow from the uplands through the valley of the river. The groundwater level in the northeast is sourced by the Syrdarya River and in the northwest it is provided by a constant head. There is a zone of natural groundwater recharge on the south and a discharge zone to the north of the Big Fergana Canal (BFC) (Figure 1).

The water-saving model has tree layers; first layer are represented by gravel and shingle deposits in the recharge zone and by loam and second zone are represented by sandy loam deposits in the discharge zone. Groundwater is unconfined in the recharge zone and confined in the discharge zone in layers two to tree. Main canals in the upper part are given in the model as a 'recharge boundary condition' because of their deep groundwater level. Canals that spread in the discharge zone are given as a 'river boundary condition' because they supply the groundwater in summer and drain it in winter. Recharge of a 'boundary condition' also includes percolation losses of precipitation and infiltration losses of irrigation water.

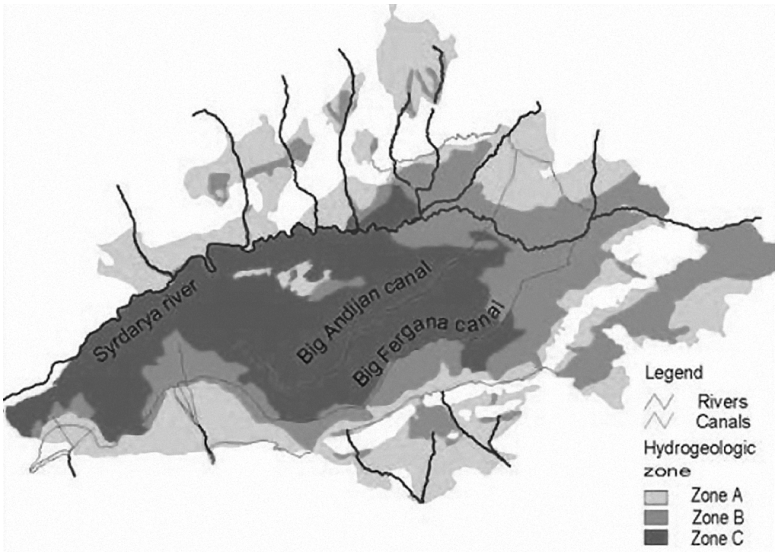

Figure 1. Hydrogeological zones in the Fergana Valley

Initial values of the parameters were determined from pumping tests, carried out by the Institute HYDROENGEO in the study area from 1980–1985. During that time 13 pumping tests were carried out including 9 in the unconfined zone and 4 in the confined zone. Location of the monitoring wells was dependent on the hydro-geological profile. For a uniform profile, the number of the observation wells taken was 2–3 in the upstream, 3–4 in spring zone and 4–10 on the periphery of the basin with a confined aquifer. According to these estimates, transmissivity of the water-bearing deposits varies in the range of 40–555 m^2/day and specific yield from 0.13–0.22 in the unconfined zone and at 0.0001 in the confined zone.

Model Calibration and Verification. Simplified models were compiled for each of the 13 wells exploited for pumping tests. The size of each model was 1,000 m x 1,000 m. The simplified models were represented by tree layers, repeating the layers of the main model of the aquifers (Djumanov 2015).

The model grid was non-uniform — 50 m near the well and was increased to 250 m closer to the border of the model. In total, the model had 328 rows and 912 columns. The boundary of the model was taken as the constant head considering that short-term pumping will not affect the water levels at 500 m distance from the well. A low permeable clay layer that is 300 m deep was taken as an impermeable layer to represent the lower boundary of the model.

In the beginning, the models were run using values of the parameters, coefficient of filtration and specific yield, determined from an analytical solution. Later, correct values of the parameters by increasing the convergence with actual data obtained during the pumping tests.

The comparison of the actual and the model calculated values of the water elevations showed a coefficient of correlation at 0.85–0.95. Based on the values of the parameters obtained from the model, the values of the coefficient of filtration and specific yields were corrected. Subsequently, the historical groundwater budget data, obtained by the HYDROENGEO Institute from April 1, 1981 22 to April 1, 1983, were used for model calibration.

This emphasizes the need for alternative additional storage capacities. One potential option is associated with subsurface storage. The upstream of Fergana Valley in the Syrdarya River Basin has favorable hydrogeology conditions to store extra winter flows for summer use. Two main and multiple small tributaries form and feed the Syrdarya River. Subsurface storage, which at this stage is almost full, is estimated to be 200 km^3 (Mavlonov et al. 2006).

First attempts to implement MAR were exploited in Uzbekistan for municipal water supply (Mirzaev 1974; Akramov 1991). During this period, a number of aquifers were identified as having a high potential for aquifer recharge. They were Narin, Iskovat-Pishkaran, Osh-Aravan, Isfara and Sokh in the Fergana Valley (Akramov 1991). Free capacities of the Osh-Aravan Aquifer were estimated at 500 Mm^3, and at 200 Mm^3 in the Sokh Aquifer. The main difference in agricultural water use in the Syrdarya River Basin as compared to other countries of Asia is that agriculture, which is entirely dependent on the canal system with furrow irrigation, produces a major part of groundwater recharge (Djumanov 2016).

Concept and Examples. MAR is intended to regulate groundwater recharge to increase water resources, improve water quality in subsurface horizons and regulate return flow from irrigated lands. The adoption of MAR practices may yield the following benefits: temporarily storing ('banking') water in subsurface horizons for later use; sustaining groundwater levels and preventing groundwater depletion or raising the water level, minimizing salinity and waterlogging; *r*educing non-processed water depletions for evaporation, flow to sink and pollution; flood control; improving surface water and groundwater quality; environmental gains (for example, stored water intended for landscape irrigation or baseflow to rivers).

Various methods of MAR and preparatory activities can be applied in agriculture, including the following: regulating groundwater natural recharge; creating artificial groundwater recharge to increase or replenish groundwater storages; adoption of water-saving technologies to reduce areal or linear groundwater recharge caused by saline fluxes from the vadoze zone; using groundwater extraction to increase leakage from riverbeds, floodplains, canals and drains; using groundwater extraction to create free subsurface horizons; effecting changes in the cropping pattern and soil tillage.

Results. The data given in Table 1 indicates that free capacities exceeding 3,000 Mm^3 in Zone A are available for storing the winter flow of small rivers, which varies within a range of 1,000–1,200 Mm^3/year and are predominantly allocated for winter crop irrigation. The indicated area is located at higher altitudes above the commands of the main canals, which deliver water from the Naryn River to water-short areas of the Fergana Valley. Free capacities available and those that potentially can be created within the main canal commands. Additional capacities which can be released by lowering the groundwater level are estimated at 186 Mm^3 per meter of groundwater level drawdown.

These data show availability of subsurface horizons for storing the winter flow. However, detailed Results The data given in Table 1 indicates that free capacities exceeding 3,000 Mm^3 in Zone A are available for storing the winter flow of small rivers, which varies within a range of 1,000–1,200 Mm^3/year and are predominantly allocated for winter crop irrigation. The indicated area is located at higher altitudes above the commands of the main canals, which deliver water from the Naryn River to water-short areas of the Fergana Valley.

Table 1. – Free capacities of the subsurface horizonsof the Fergana Valley.

№	Aquifers	Recharge zone	
		Area* (ha)	Free capacity (Mm^3)
1	*2*	*3*	*4*
1	Almaz-Varzyk	19,825	231
2	Kukumbai	2,658	54
3	Kasansai	4,351	30
4	Iskovat-Pishkaran	19,439	359
5	Sokh	34,589	1,452
6	Altyaryk-Beshalysh	7,366	28
7	Namangan	5,196	77
8	Isfara	4,385	90
9	Mailisu	17,513	22
10	Karaungur	3,944	35

1	*2*	*3*	*4*
11	Naryn	28,393	167
12	Chust-Pap	7,936	147
13	Andijan-Shahrihan	7,919	16
14	Chimien-Aval	3,651	88
15	Osh-Aravan	21,223	324
16	Nanai	4,349	71
17	Syrdarya	5,810	32
18	Yarmazar	2,210	67
	Total	**198,737**	**3,861**

Source: Mavlonov A., Djumanov J., et al. 2006.

Note: The area within the recharge zone where free capacities are available.*

Free capacities available and those that potentially can be created within the main canal commands. The data indicate free subsurface capacities in the zone of the main canals, available for water banking, totaling 760 Mm^3. Additional capacities which can be released by lowering the groundwater level are estimated at 186 Mm^3 per meter of groundwater level drawdown. These data show availability of subsurface horizons for storing the winter flow. However, detailed modeling and economic analysis are required to estimate the optimal level of groundwater abstraction and recharge. MAR has to be preceded by increasing the groundwater abstraction to lower the water table. The areas suitable for groundwater irrigation and conjunctive use in the Fergana Valley are illustrated in Figure 2.

The estimates show that the area suitable for groundwater irrigation totals to 290,000 ha and 243,000 ha for conjunctive use. The rest of the area can be kept irrigated using canal water.

The potential volumes of groundwater extraction depend on hydrogeology conditions (Zones A and B) and the replenishable groundwater resources.

Total groundwater recharge in Zones A and B (Figure 1) is estimated to be in the range of 5,624–6,005 Mm^3/year in low and high water years, respectively.

Expanding the area under conjunctive use and the adoption of water-saving technologies will decrease the groundwater recharge in summer due to reducing losses from canals and irrigated fields. Recharge deficit (~1,000 Mm^3/year) can be compensated using the winter flow of the Naryn River and small rivers. The data given above indicate the potential for MAR at the regional level and the next step is assessing the MAR potential at the pilot aquifer level.

The actual values of the groundwater budgets and elevations were compared with the model simulation results. The comparison showed a high convergence.

The value of the coefficient of correlation was at 0.989. Changes in the groundwater budget (groundwater extraction, recharge and evaporation) since 1980 were considered in the formulation of the modeling.

Modeling Results. Results of the modeling is shown in Figure 3 and indicate high groundwater levels under the current baseline scenario 1 and forming the free capacities under scenario 2. A significant lowering of the groundwater level under scenario 3 is the consequence of the intensive groundwater extractions exceeding the groundwater recharge.

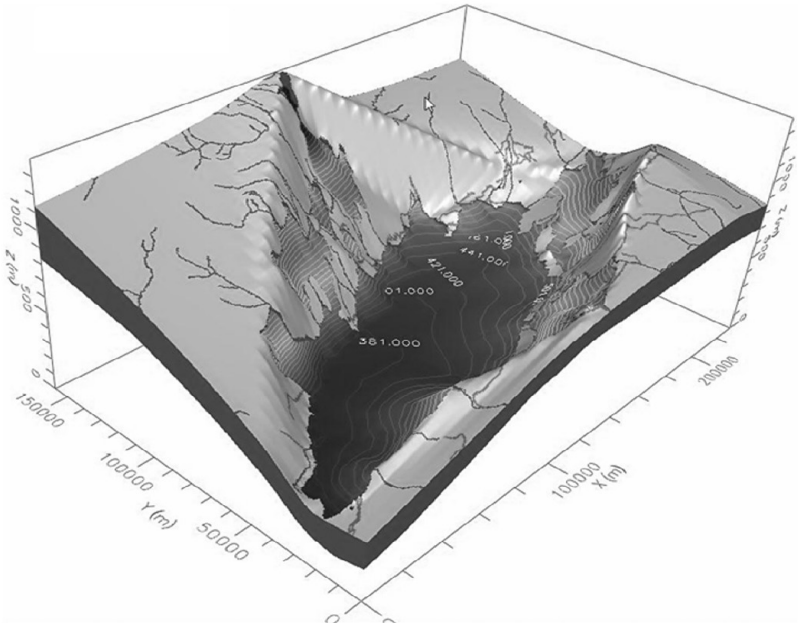

Figure 2. General view study area on the geofilterational of model

The regime of filling and draw off of the subsurface reservoir under scenario 1 of minimum extraction levels of groundwater for irrigation, the subsurface reservoirs are filled during summer and drawn off in winter for subsurface outflow and discharge to the drain system. Intensive groundwater extraction for irrigation results in drawing off water levels in summer and minor filling happening in the winter. This increases the risk of groundwater depletion and degradation in quality due to saline fluxes from the Vadoze Zone and surrounding inter-fan depressions.

Managed aquifer recharge in scenario 4 sustains the groundwater storages and maintains the water quality, since 100 Mm^3 of freshwater will be stored underground. Groundwater storages are depleted in summer by intensive groundwater extraction but replenished in winter by managed aquifer recharge.

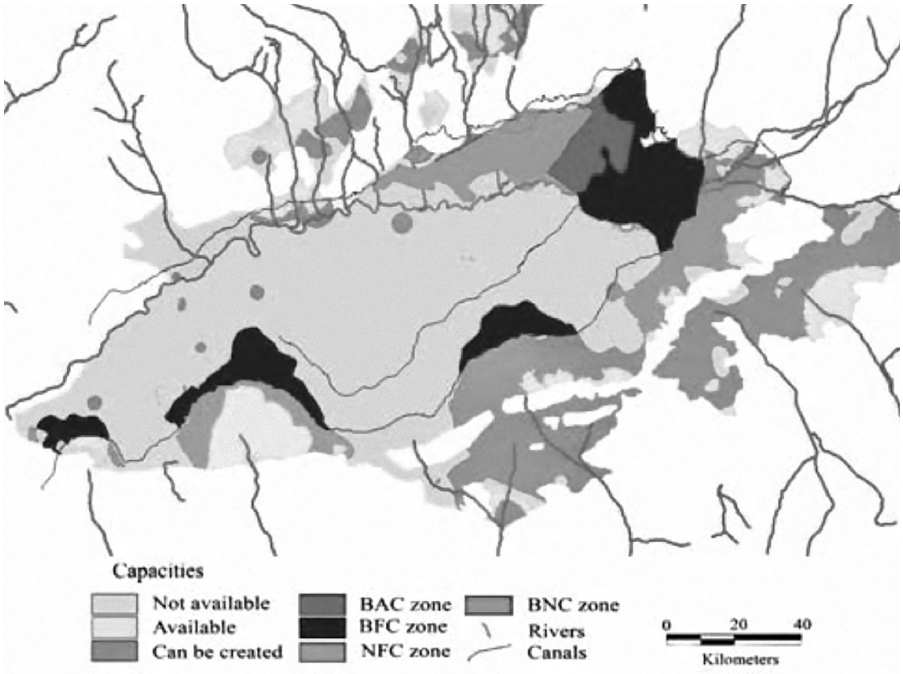

Figure 3. The areas with favorable hydrogeology conditions for storing winter flow of the Fergana Valley

This combination aims at sustaining groundwater storages and quality in the long run. Location of the monitoring wells was dependent on the hydrogeological profile. For a uniform profile, the number of the observation wells taken was 2–3 in the upstream, 3–4 in spring zone and 4–10 on the periphery of the basin with a confined aquifer. The pumping tests were carried out with fixed yields of the wells so as to simplify the analysis of the obtained data. The yields were from 25 to 100 l/s and the groundwater level drawdown by 3–4 m in the exploited well.

The yields of the wells were selected to achieve quasi-stationary regime and groundwater level drawdown by 20 cm in the remote well after 5–10 days. Duration of the pumping test was 10–15 days in the unconfined zone and 15–20 days in the confined zone. Groundwater level drawdown data was collected for each 1–10 minutes at the beginning of the pumping and three times per day at the end stages and at the remote well. The hydrogeology parameters were estimated using groundwater level drawdown and restoration data (Figure 4).

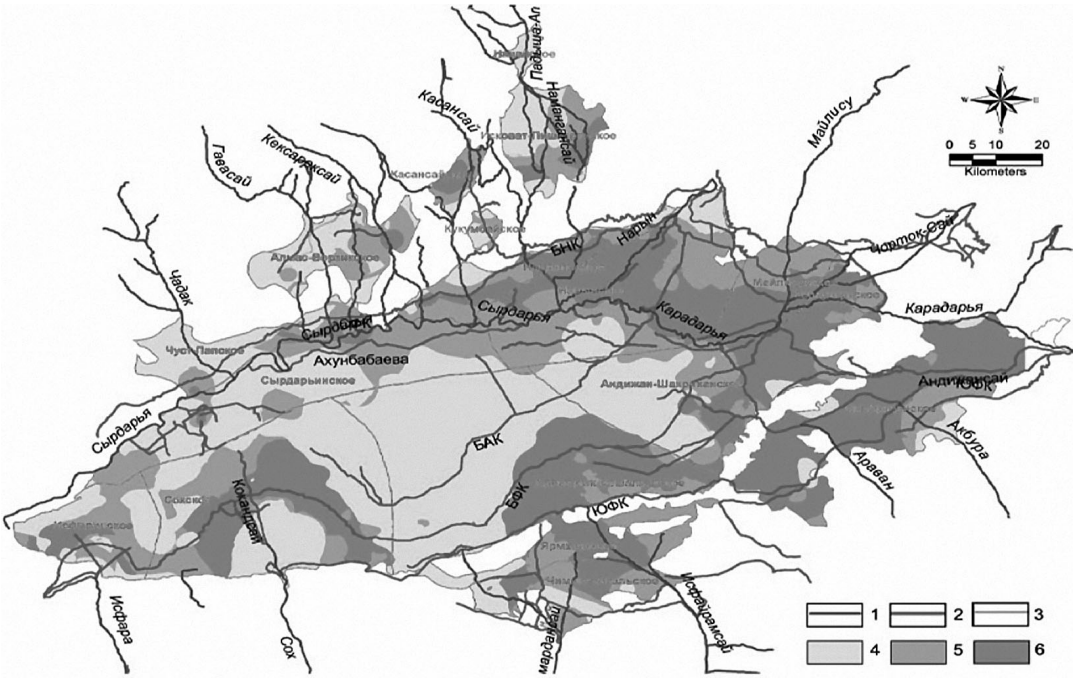

Figure 4. Sharing use surfase and aquifers water of the Fergana Valley. 1 – Rivers, 2 – Canals, 3 – Border of the aquifers, 4 – Aquifers water use; 5 – Surfase and aquifers water on complecs use; 6 – Surfase water use

The concentration of the dissolved ions is much higher in the groundwater of the inter-fan depressions. There are two main factors affecting the quality of the groundwater of the aquifer: i) the leakage from the riverbed contributes to the sustenance of the water quality;

and ii) the subsurface inflow from the inter-fan depressions and the upstream and saline fluxes from the topsoil, increase the concentrations of the dissolved solids.

During the field studies carried out in 2010, it was found that when the river flow exceeded the transporting capacity of the main canals, it is released to the headwork downstream. Using the relation obtained for 2010, the leakage from the riverbed was calculated for 1995–2010. Changes in the groundwater salinity in the study area from 1995 to 2010 indicate tight relations between the river flow and the groundwater. Data show that the losses from the riverbed in the summer varies from 98 Mm^3 in low water years to 137 Mm^3 in high water years. The salinity of the groundwater, as and when affected by the leakage from the riverbed, begins to decrease in the spring and continues to the fall. The gradual increase in the share of the saline water in the groundwater budget indicates the need for measures to sustain the quality of the water.

There are at least two ways to sustain the water quality: i) to adopt water-saving technologies to reduce losses from the irrigated fields and to increase the natural recharge from the riverbed and other recharge structures; and ii) to restrict irrigation in the upstream of the river. This concept of adopting water-saving technologies for conserving water for enhancing natural recharge of groundwater was further tested through MAR modeling.

Conclusions. The study followed the stepwise procedure of implementing manage in the Fergana Valley. The first step is the regional assessment of the potential for MAR and for shifting from canal irrigation to conjunctive surface water-groundwater use. The second step is the application of MAR for aquifers, located in the tail end of main canals. The next step is to move to the next aquifers along the main canals. When the process is complete for all of the separate aquifers along the main canals, MAR implementation for the entire Fergana Valley is considered. The regional assessments in the Fergana Valley show that over 500,000 ha or 55% of the currently irrigated land can be shifted from canal irrigation to conjunctive surface water-groundwater use, which will reduce the return flow to the river by 30%, or by 1,000 Mm^3/year, and form free storages of 500 Mm^3 in the command areas of the main canals.

References:

1. Akramov A. A. Regulating water resources in groundwater aquifers. Tashkent: Science of Uzbekistan. – 1991. – 207 p. (in Russian).
2. Djumanov J. X. Modeling hydrogeological systems of the Ferghana Valley. Water problems: science and technology. Baku. Azerbaijan. – 2015. – No 1. – P. 52–62. (in Russian).
3. Djumanov J. X. Geoinformation technologies in hydrogeology. – Tashkent: NIIMR. – 2016. – 251 p.
4. Lange O. K. Hydrogeological and engineering geological conditions of Uzbekistan. – 1964. – Vol. II. – Tashkent: Fan, – 319 p.
5. Mavlonov A. A.; Borisov V. A.; Djumanov J. Kh. – 2006. Assessment of groundwater resources of Fergana Valley. Paper presented in the Regional Conf. on: Conjunctive use of ground and surface water resources of Fergana valley for irrigation, – November 2, – 2006. – Tashkent, Uzbekistan. (in Russian)
6. Mirzaev S.Sh. Groundwater storages of Uzbekistan. – Tashkent: Fan. – 1974. – 156 p.
7. Samarskiy A. A. The theory of difference schemes. – M. Nauka. – 1983. – 616 p.
8. Habibullaev I., Umarov U. Fundamentals of computerization in hydrogeology. – Tashkent. Kibernetika. – 1995. – 110 p.

Section 6. Mathematics

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The generalization of the binomial theorem for the case arbitrary geometric progression

Abstract: The General formula of construction of sums of geometric progressions in an arbitrary natural power was obtained. The properties of such sums and their applications have been considered.

Keywords: sum of the terms of a geometric progression, binomial coefficient, the polynomial theorem.

The amount of members of a geometric progression is defined by the formula

$$G(a;n;1)=\sum_{k=0}^{n}a^k=1+a+a^2+\ldots+a^n=\frac{a^{n+1}-1}{a-1}. \quad (1)$$

The question arises, what kind of the coefficients $c_k(n,t)$ of the exponential sum will be, if we shall construct $G(n;a;1)$ to a positive degree t

$$G(a;n;t)\equiv\left(\sum_{k=0}^{n}a^k\right)^t=\left(\frac{a^{n+1}-1}{a-1}\right)^t=\sum_{k=0}^{nt}c_k(n,t)a^k. \quad (2)$$

If $n=1$, then the answer is known, it is the binomial theorem

$$G(a;1;1)=(1+a)^t=\sum_{k=0}^{t}\binom{t}{k}a^k, \quad (3)$$

Where $\binom{t}{k}\equiv C_t^k=t!/(k!(t-k)!)$ is a binomial coefficient.

If $t=2$ then the result is also known [1, 2]

$$\left(1+a+a^2+\ldots+a^n\right)^2=\sum_{k=0}^{n}a^{2k}+2\sum_{k_1(<k_2)=0}^{n-1}a^{k_1}a^{k_2}=$$
$$=\sum_{k=0}^{n}(k+1)a^k+\sum_{k=n+1}^{2n}(2n+1-k)a^k. \quad (4)$$

For example,

$$\left(1+a+a^2+a^3\right)^2=1+2a+3a^2+4a^3+3a^4+2a^5+a^6. \quad (5)$$

View of the square of the sum of a geometric progression $G(n;a;2)$ easy to remember: first, the coefficients in power sum linearly increases through «1», peak is equal to $(n+1)a^n$, and then linearly decrease. At higher powers of t contemporary mathematics proposes to use the polynomial theorem [3; 4]

$$G(n,t)\equiv\left(\sum_{k=0}^{n}a^k\right)^t=\sum_{k=0}^{tn}c_k(n,t)a^k=$$
$$=\sum\frac{t!}{s_0\cdot s_1\cdot\ldots\cdot s_n}1^{s_0}\cdot a^{s_1}\cdot a^{2s_2}\ldots\cdot a^{ns_n}, \quad (6)$$

where are summed up all the sets of nonnegative integers $(s_0;s_1;\ldots;s_n)$ are summed are summed provided $s_0+s_1+\ldots+s_n=t$. The coefficients $c_k(n,t)$ have the same symmetry as in (3–5), i. e. they first increase then symmetrically decrease and their sum $\sum_{k=0}^{nt}c_k(n,t)=(n+1)^t$. The calculation of specific coefficients in the exponential sum in (6) for large n and is t rather cumbersome procedure. In the paper [4] was proposed formulas for the analytical calculation of $c_k(n,t)$. In this article, we considerably simplify the computation of such coefficients and dive their output and new versions of applications.

Considering the symmetry it is necessary to calculate under the even nt only the coefficients $0\le k\le(nt)/2$, and under odd nt — with $0\le k\le(nt-1)/2$. Subsequent numbers $c_k(n,t)$ obey the rule $c_k(n,t)=c_{nt-k}(n,t)$. A characteristic feature of the calculation $c_k(n,t)$ is that the entire array of coefficients $\{c_k\}$ is divided into blocks of $(n+1)$ coefficients in each bloc, and each bloc $c_k(n,t)$ should be calculated by its formula. Total necessary number of blocs is the d. If nt is even and the $(nt+2)$ not divisible by $(2n+2)$, then $d=\left[\frac{nt+2}{2(n+1)}\right]+1$. If the fold is, then $d=\left[\frac{nt+2}{2(n+1)}\right]$. Here $[x]$ gives maximum the integer not greater than x. When nt is odd $d=\left[\frac{nt+1}{2(n+1)}\right]+1$ or $d=\left[\frac{nt+1}{2(n+1)}\right]$. If $\left[\frac{k}{n+1}\right]=s$, then $c_k(n,t)$ is in the s block, $0\le s\le d$. Because the coefficients of the binomial theorem, in our notation $G(a;1;t)$, are known, and it is included in the General scheme, the output of the calculation $c_k(n,t)$ we shall spend on it. It turns out that binomial coefficients can be considered in such a complex scheme

$$c_k(1,t)=t\sum_{p=0}^{s}(-1)^p\frac{(k+t-1-2p)!}{(t-p)!(p)![k-2p]!}. \quad (7)$$

In (7) p number blocks that stand in front of k and the block containing $c_k(1,t)$. Direct calculation $c_k(1,t)$, of course, be much simpler: $c_k(1,t)=t!/((t-k)!k!)$, but it is difficult option provides the key to calculate the coefficients $c_k(n,t)$ in the General

case. We show an example of the use of the formula (7). Have $n=1$ such a sum from the selection of the blocks and their numbering

$$(1+a)^8 = \underbrace{1+8a}_{0} + \underbrace{28a^2+56a^3}_{1} + \\ + \underbrace{70a^4+56a^5}_{2} + \underbrace{28a^6+8a^7}_{3} + \underbrace{a^8}_{4}. \quad (8)$$

Each block of coefficients consists of $(n+1)=2$ numbers. In (8) are only four blocks, but in the calculation it is necessary to take the first three of the block with $p=\{0;1;2\}$. There are $nt+2=10$, $2(n+1)=4$, $d=3$. Indeed, the last increasing the coefficient $c_4(1,8)=70$ is included in the block with $p=2$. Thus,

$$c_4(1,8) = 8\sum_{p=0}^{2}(-1)^p \frac{(4+7-2p)!}{(t-p)!(p)![4-2p]!} = \\ = 8\left[\frac{9\cdot 10\cdot 11}{2\cdot 3\cdot 4} - \frac{8\cdot 9}{2} + \frac{7}{2}\right] = 70.$$

Generalizing equation (7) and using the method of mathematical induction, we obtain a General expression for the coefficients $c_k(n,t)$ in $G(a;n;t)$

$$c_k(n,t) = t\sum_{p=0}^{s}(-1)^p \frac{(k+t-1-np-p)!}{(t-p)!(p)![k-p-np]!}. \quad (9)$$

The calculation of these ratio can be written like this

$$c_k(1,t) = \sum_{p=0}^{s}(-1)^p \binom{t}{p}\binom{t+k-1-p-pn}{t-1}. \quad (10)$$

Formula (9) for $c_k(n,t)$ checked our numerical calculations for a large number of parameters and is new in the theory of numbers. In monographs and handbooks [3–6] it is not discovered.

Lets show an application of formulas (9–10) in the following example. We need to calculate $G(a;3;3)=(1+a+a^2+a^3)^3$. Opening parenthesis in powers of a^k, we get «10» terms. It is sufficient to calculate the coefficients $c_k(n,t)$ only for the first five components, since five others repeat the first five coefficients in reverse order. Each bloc contains $(n+1)=4$ terms. The calculation will involve two blocks. The coefficients of the zero block $(n=3,t=3)$ (9) is equal to $c_k(3;3)=(k+2)!/2\cdot k!$

$$c_0=1; c_1=3; c_2=6; c_3=10.$$

The last coefficient c_4 is included in the block with $s=p=1$, and it is calculated according to the formula with two members and $c_4 = 6!/2\cdot 4! - 3 = 12$. Thus,

$$G(a;3;3) = 1+3a+6a^2+10a^3 + \\ +12a^4+12a^5+10a^6+6a^7+3a^8+a^9. \quad (11)$$

Lets discuss the issue of the use of the sums $G(a;n;t)$. Since they are a generalization of the binomial theorem in the case when there are more than two terms in the basis, then, considering the vast number of applications of the binomial theorem, the potential application of new amounts is wide. Look at some of them.

1. Calculation of improper integrals of the form

$$\int\left(\frac{x^{n+1}-1}{x-1}\right)^t dx = \sum_{k=0}^{nt}\frac{c_k(n,t)x^{k+1}}{k+1} + C. \quad (12)$$

2. There is the option of folding the exponential amount by type of the coefficients in a compact form. When we see $(1+2a+a^2)$ then we immediately write $(a+1)^2$. Now our possibilities are expanding. For example,

$$1+5a+15a^2+30a^3+45a^4+51a^5+45a^6 + \\ +30a^7+15a^8+5a^9+a^{10} = (1+a+a^2)^5$$

3. Differentiation of $G(a;n;t)$ with respect to «a» gives a new analytically calculated amounts

$$\frac{dG(a;n;t)}{da} = \sum_{k=1}^{n} k c_k(n,t) a^{k-1} = \\ = t\left(\frac{a^{n+1}-1}{a-1}\right)^{t-1}\frac{(n+1)(a-1)a^n - a^{n+1}+1}{(a-1)^2}. \quad (13)$$

For example, differentiating $G(a;3;2)$ we find

$$1+3a+6a^2+6a^3+5a^4+3a^5 = \\ = \frac{(a^4-1)(3a^4-4a^3+1)}{(a-1)^3}. \quad (14)$$

When $a=2$ both sides of equation (14) are «255».

4. There are cases analytical solutions of algebraic equations of high degree. For example the equation of the fifth order

$$3a^5+5a^4+6a^3+6a^2+3a-1359=0,$$

if you look at the equality (14) has a root $a=3$. Cases may arise with allocating a block $G(a;n;t)$ in varying degrees. For example the equation $a^4+2a^3-3a^2-2a-12=0$ can be rewritten as a quadratic equation $G(a;2;2)-6G(a;2;1)-7=0$ with roots «7» and «-1». $G(a;2;1)=7$ gives $a^2+a-6=0$; $a_1=2; a_2=-3$. The second number «-1» yields the complex value a.

5. The addition of increasing amounts of geometric progressions made new calculated amount. For example, we put $G(a;n;1)$

$$\sum_{n=0}^{N}G(a;n;1) = \sum_{k=0}^{N}(N-k)a^k = \\ = \frac{a^{N+2}+(N+2)a-(N+1)}{(a-1)^2}. \quad (15)$$

Knowing the coefficients in $G(a;n;t)$ we can add these polynomials and get the calculated amount.

References:

1. Druzhinin V. V., Sirotkina A. G.//NTVP, – No 4, – P. 15–17, – 2016.
2. Druzhinin V. V., Konkova V. I.//NTVP, – No 6, – P. 19–21, – 2016.
3. Poznyakov S. N. and Rybin S. V. Discrete mathematics. – M., – Academy, – 2008.
4. Korn G., Korn T. Handbook of mathematics, Science, GHML, – M., – 1974. – P. 31, 135.
5. Graham Z., Knuth D., Patashnik O. Concrete mathematics, – Moscow, "Mir", – 1998. – P. 313.
6. Gradshteyn I. S., Ryzhik I. M. Tables of integrals, sums, series and products. GIFML, – Moscow, – 1962. – P. 15–16.

Section 7. Medical science

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Doplerographic values of cerebral hem dynamics in gerontologic patients with epilepsy

Abstract: Old people have notable increase of the values of linear systolic velocity of blood flow in the examined cerebral veins and development of compensatory mechanisms of venous flow out, testifying the presence of disorder of venous circulation, and noted mostly within the late stages of cerebral vascular pathology.

Keywords: epilepsy, dopplerographic changes, geriatric patients.

Old people have notable increase of the values of linear systolic velocity of blood flow in the examined cerebral veins and development of compensatory mechanisms of venous flow out, testifying the presence of disorder of venous circulation, and noted mostly within the late stages of cerebral vascular pathology.

Topicality. Epilepsy is a widespread pathology, the morbidity rate of which in various countries varies from 11/100000 to 190/100000 of population. The incidence of epilepsy among adults was about 15 cases per 100 thousands of population, and it grows starting approximately from 50 years old, reaching 50–75 cases per 100 thousands of population in the age 60–75 years old respectively [1, 6]. Several studies provide the data, that the risk of epilepsy in patients above 70 years old is higher, then within initial 10 years of life [7].

Epileptic seizures proceed with impairments in various parts of cerebral metabolism: oxidation stress, disorder of mediator amino acids' exchange, suppression of energetic exchange [5]. Alterations in cerebral hem dynamics in patients with epilepsy make the application of transcranial doplerography (TCD) useful, as that method provides achievement of reliable information about speed and spectral characteristics of the blood flow in cerebral vessels, and, respectively, about the status of cerebral hem dynamics [3]. Application of TCD using various functional loads of physical and chemical nature is considered to be more significant perspective [2, 4]. The advantage of TCD is its non-invasive character and, consequently, possibility of its application for a wider contingent of patients and multiple repetition. Within the period of compensatory mechanisms exhaustion, besides the statement of decompensation, it is possible to determine degree of its expression and to define the direction of the shift from optimum within the limits of homeostatic range [5].

The objective: to study peculiarities of cerebral hem dynamics in patients with epilepsy in gerontologic practice.

Materials and methods of the research: Patients were divided to basic and control groups. The basic group involved 89 patients with epilepsy (according to WHO classification above 60 years old) of elder (60–75 years old) and senile age (75–90 years old). The control group comprised 52 patients with epilepsy in the age from 25 to 60 years old.

Diagnosis of epilepsy was based on the complex of clinical, electroneurophysiological, and neuroradiological data. It was formulated in compliance with the guidelines of International Anti-epileptic League (1989).

The technology of ultra sound checking of carotid arteries includes scanning in three planes: two longitudinal (frontal and dorsal) and one transversal. Application of 3 planes of scanning minimizes the risk of diagnostic mistakes. The studies were conducted with the help of linear sensor with 5–7MHz frequency.

The results of the research: In 58 (65.2%) elder patients with epilepsy we determined hem dynamic significant stenosis of cerebral arteries, which was singular in 17 (19.1%) patients and multiple in 41 (46.1%). Singular stenosis alterations in cerebral arteries were determined in 9 (75%) patients with the II stage of CCI, 4 (44.4%) patients with cranial trauma, 2 (50%) patients with neural infection, and 2 (40%) with chronic alcoholic intoxication, which was the etiologic factor of epilepsy development. Multiple stenosis of cerebral arteries was diagnosed in 36 (87.8%) patients with the III stage of CCI, 2 (22.2%) patients with cranial trauma, 1 (25%) patient with neural infection, which was the etiologic factor of epilepsy development, and 2 (40%) patients with chronic alcoholic intoxication, which was also the etiologic factor of epilepsy. 13 (14.6%) elder patients had occlusion of cerebral arteries, which was singular in 4 (4.5%) and multiple in 9 (10.1%) of these patients. Singular occlusion of cerebral arteries was diagnosed in 4 (30.7%) patients with previous cerebral insult. Multiple occlusion of cerebral arteries was determined in 9 (69.2%) patients with recurrent cerebral insults.

In 3 (5.8%) young patients with symptomatic epilepsy developed as a result of cranial trauma we determined a stenosis of cerebral arteries. In 2 (3.8%) young patients with symptomatic epilepsy developed as a result of insult we determined singular occlusion of cerebral arteries.

Average linear velocity of blood flow (ALVBF) in common carotid artery of elder patients with rare seizures was 34.6 cm/sec, with moderate frequency of seizures 31.4 cm/sec, and in case of often seizures 27.2 cm/sec. ALVBF in the inner carotid artery in young patients with epilepsy was equal to 42.3 cm/sec. ALVBF in the inner carotid artery in elder patients with rare epileptic seizures was 30.3 cm/sec, with moderate frequency of seizures was 27.1 cm/sec, and with often seizures 24.8 cm/sec. ALVBF in anterior cerebral artery in young patients with epilepsy was 36.4 cm/sec.

ALVBF in anterior cerebral artery in elder patients with rare epileptic seizures was 30.4 cm/sec, with moderate frequency of seizures was 26.9 cm/sec, and with often seizures 23.8 cm/sec. ALVBF in the interim cerebral artery in the elder patients with rare epileptic seizures was 27.8 cm/sec, with moderate frequency 25,8 cm/sec, and with often seizures 23.6 cm/sec. ALVBF in posterior cerebral artery in elder patients with rare epileptic seizures was 30.1 cm/sec, with moderate frequency of seizures 28.3 cm/sec, and with often seizures it was 23.4 cm/sec. ALVBF in spinal artery in elder patients with rare epileptic seizures was 27.1 cm/sec, with moderate frequency 24.7 cm/sec, and with often seizures 22.3 cm/sec.

Comparative analysis of ALVBF in elder patients with epilepsy in cerebral arteries of the left and right hemispheres of brain showed, that asymmetry of ALVBF was observed rarely and mostly in patients with previous stroke. Comparative analysis of the values of average linear velocity of blood flow in cerebral arteries in elder patients with epilepsy and young patients showed, that these values were reliably lower in elder patients ($p>0.05$), than in the patients of the control group.

Elder patients with epilepsy had notable dependence of ALVBF in cerebral arteries on the frequency of epileptic seizures: the greater was the frequency of epileptic seizures development, the lower the velocity of blood flow was in cerebral arteries. It is possibly linked with the fact, that frequent epileptic seizures are registered within later stages of cerebral vascular pathology, accompanied by expressed structural alteration in magistral arteries of head, among which there is prevalence of multiple stenosis lesions in cer4ebral arteries.

Pulsation index, representing the ratio of the difference of maximal systolic and diastolic velocity to the average velocity of blood flow, is the most characteristic reflection of elastic-flexible properties of arteries, and indirectly indicates the status of intracranial pressure, by these means demonstrating the interrelation of cerebral blood flow with intracranial pressure.

Pulsation index in common carotid artery in young patients with epilepsy was equal to 1.04. Pulsation index in common carotid artery in elder patients with rare epileptic seizures was 1.12, while with moderate frequency of seizures it was 1.21, and with often seizures 1.37. Pulsation index in inner carotid artery in young patients with epilepsy was 1.05. Pulsation index in inner carotid in elder patients with rare seizures was 1.09, with moderate frequency of seizures 1.27, and with often seizures it was equal to 1.36. Pulsation index in the anterior cerebral artery in young patients was equal to 1.03. Pulsation index in the anterior cerebral artery of elder patients with rare seizures was 1.13, with moderate frequency 1.32, and with often seizures 1.43. Pulsation index in the interim cerebral artery in young patients was 0.99. Pulsation index in the interim cerebral artery in elder patients with rare seizures was 1.03, with moderate frequency of seizures 1.25, and with often seizures it was 1.38. Pulsation index in the posterior cerebral artery in young patients with epilepsy was 1.03. Pulsation index in the posterior cerebral artery of elder patients with rare seizures was 1.09, with moderate frequency 1.17, and with often seizures 1.28. Pulsation index in spinal artery of young patients with epilepsy was 1.03. Pulsation index in spinal artery in elder patients with rare epileptic seizures was 1.08, with moderate frequency 1.26, and often seizures 1.38. the results of the performed study showed, that different from younger patients in elder patients with epilepsy the values of pulsation index were higher. The greatest increase of pulsation index in elder patients was registered in anterior, interim, spinal, and common cerebral arteries. Lesser increase of pulsation index in elder patients with epilepsy was registered in posterior and inner carotid arteries. Alteration of the values of pulsation index in elder patients was interrelated with the frequency of epileptic seizures development: the greatest values of pulsation index were observed were observed in elder patients with frequent epileptic seizures.

Thus, compared with young patients the elder patients with epilepsy had notable increase of the velocity of cerebral blood flow in the examined veins.

Conclusions:

1. Characteristic alterations of pulsation index revealed in elder patients with epilepsy testify the decrease of elasticity and flexibility of vascular system in the patients with frequent epileptic seizures, registered mostly within the later stages of cerebral vascular pathology.

2. Analysis of structural alterations in magistral arteries of head (MAH) demonstrated, that compared with young patients the elder patients with epilepsy had characteristic greater prevalence of structural alterations in MAH, represented mostly by multiple stenosis in cerebral arteries.

3. Elder patients with epilepsy had notable dependence of ALVBF in cerebral arteries on the frequency of epileptic seizures: the greater was the frequency of epileptic seizures development the lower the velocity of blood flow was in cerebral arteries.

4. Results of the performed study testify the presence of more expressed alterations of cerebral hem dynamics in elder patients with frequent epileptic seizures, noted mostly within the later stages of cerebral vascular pathology.

References:

1. Belkin A. A. Transcranial doplerography in intensive therapy/A. A. Belkin, A. M. Alasheyev, S. N. Inushkin. Petrozavodsk. Intel Tech. – 2006. – P. 103 (in Russian).
2. Brown T. Epilepsy: Clinical guidelines. Translated from English by T. Brown, G. Cholmes. M: Binom, – 2006. – P. 288 (in Russian).
3. Vshenski B. S. Modern tactics of struggle against insult. Folliant. – 2005. – P. 283 (in Russian).
4. Geht A. B., Melikyan E. G., Lebedeva A. V. Epilepsy in elder patients: etiology, diagnostics, therapy, quality of life//Epilepsy, – 2010. – P. 452–62. (in Russian).
5. Kirillovskikh O. N. Complex approach to the therapy of epilepsy in elder and senile patients taking into account etiology, pathogenesis, and peculiarities of clinical progress/O. N. Kirillovskikh, A. S. Shershever//Ural Medical Journal. – 2010. – V 68, – No 3. – P. 136–440. (in Russian).
6. Caprio A., Hauser W. A. Epilepsy in the developing world//Curr Neurol Neurosci Rep. – 2009. – Vol. 9, – No 4. – P. 319–326.
7. Shuaib A., Hussain M. The past and future of neuroprotection in cerebral ischemic stroke//Eur. Neurol. – 2008. – Vol.59. – P. 4–1443.

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Evaluation of clinical signs of rheumatoid coxitis according to the desease stage

Abstract: The article explains the clinical evaluation of rheumatoid coxitis by its stage. Clinical assessments were conducted depending on several aspects. 85 patients were surgically treated in 2 partner clinical bases. After the calculating the clinical symptoms of rheumatoid coxitis we came to conclusion that this desease has 4 stages. But only patients in III and IV stage needed surgical treatment, i. e. — total hip replacement. On third month after surgery and physical rehabilitation the analysis of dynamic motion of 83 hip joints showed significant improvement of movement amplitude. 2 were with poor results.

Keywords: rheumatoid coxitis, hip joint, hip replacement, coxitis stages.

Affection of hip joint of patients with rheumatoid arthritis occurs rarely compared with other joints. After a few years the involvement of the joint into pathological process occurs. Both of hip joints are not involved into the process simultaneously, oftenly a single-joint start, i. e. gradual affection of joints is observed. Therefore, one patient has different degrees of severity of clinical signs in the proccess.

We observed 85 patients with rheumatoid coxitis in III and IV stage, which were surveyed from 2010 to 2016 in the Department of Orthopedics of UzRITO and in the Department of Traumatology and Orthopedicsof RCH № 1.

Clinically, all patients with rheumatoid coxitis had constant pain, which intensified during the night. Pain also intensified at the walking, standing and slightly decreased at a rest 31 (36.47%) of patients had pain in the groin. Pain in rear side of pelvis troubled 36 (42.35%) patients and 19 (22.35%) patients had pain in the lateral part of femur. Another sign of rheumatoid coxitis was limiting of flexion in the hip joint at stage III up to 50–65 0 and extension up to 15 0. At stage IV the flexion of the hip joint was less than 50 0 and the extension less than 15 0 (Table 1).

Abduction and adduction of the hip joint at stage III were up to 50; at stage IV were respectively 0. Quadriceps muscle force was greater at stage III than at stage IV and reached 40% vs. 30%. Force of hip biceps muscle at stage IV was less than 25%.

Table 1. – Clinical signs depending on the stage of the disease

The signs	Norm 0	Stage 1	Stage 2	Stage 3	Stage 4
1. Pain	No pain	Pain under a load	Pain at a rest	Pain under a load and at a rest	Constant pain
2. Flexion in the hip joint	>100^0	85–95°	70–80°	50–65°	<50°
3. Deficiency of extension in the hip joint	No deficiency	5°	10°	15°	>15°
4. Abduction in the hip joint	>15°	15°	10°	5°	0°
5. Adduction in the hip joint	>15°	15°	10°	5°	0°
6. Force of quadriceps muscle of hip	>70%	60%	50%	40%	<30%
7. Force of hip biceps (% of quadriceps muscle)	>60%	50%	40%	30%	<25%
8. Rising from «semi-erect» position, sm	>25	15–24	10–24	5–9	<5
9. Rising/sitting down	35 sm (sofa)	40 sm (seat of car)	45 sm (simplechair)	50 sm	>55 sm
10. Speed of walking (m/s)	>1,4	1,0–1,3	0,7–0,9	0,5–0,6	<0,5
11. Activity in everyday life	There are no limiting	Patient can perform all type of motions in sitting position	Patient needs additional devices to help put on shoes; can't do pedicure	Patient needs someone's assistance to put on shoes and socks	Assistance in everything

Rising from «semi-erect» position and rising/sitting down at stage III reached 5–9 cm and 50 cm respectively, and at stage IV <50 and> 55 cm. Speed of walking at stage III was 0.5–0.6 m/s, at stage IV was <0.5 m/s. Patients' activity in everyday life at stage III was limited and they needed someone's assistance at putting on socks and shoes. Patients at stage IV of rheumatoid coxitis needed constant care of relatives.

Patients with rheumatoid coxitis, especially with bilateral form become severe invalids. Their activity at walking reduces, self-service

becomes more difficult, and they need in assistance of others, because they can't service themselves.

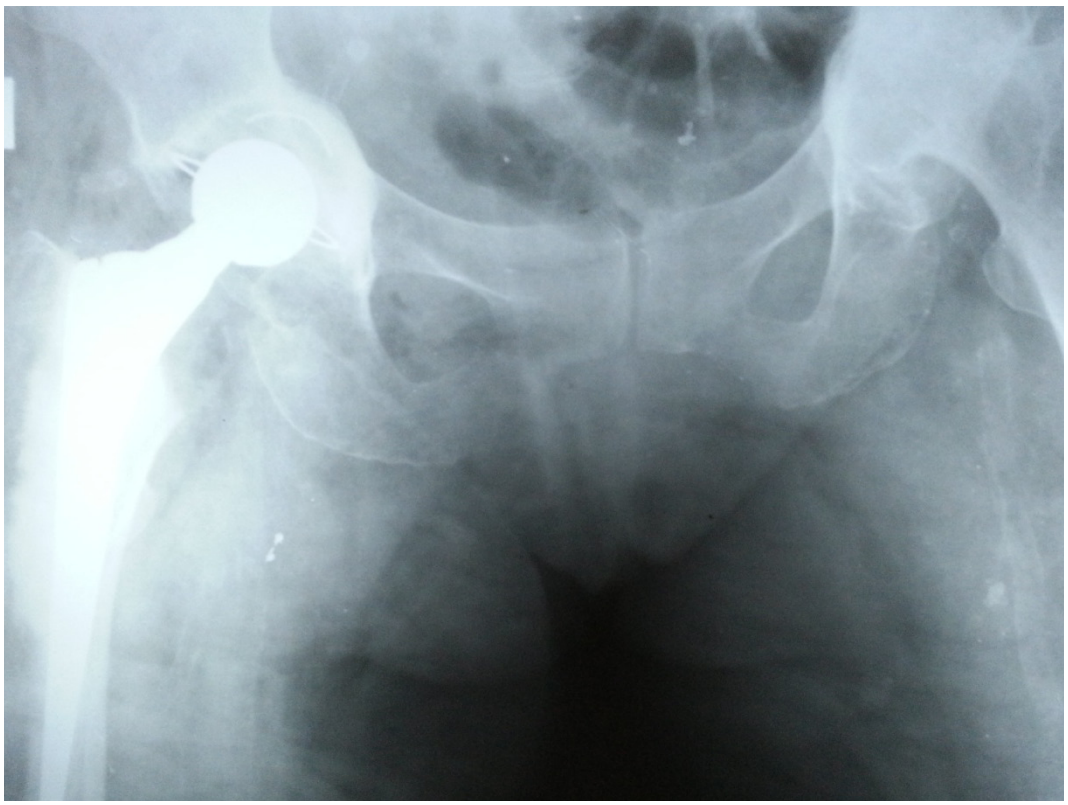
There are examples from practice. The patient S.D of 55 years old, admitted into the Department of Orthopedics of UzRITO with diagnosis:

Juvenile rheumatoid arthritis, articular type, slow-progressive course, medium activity, stage III, JFI-3, left femoral head aseptic necrosis, secondary protrusional coxarthritis III.

Complaints on the admission: stiffness in all joints, pain in the right hip joint. Motions in the right hip joint are painful and limited. Flexion in the hip joint is 50°, extension is 15°. Abduction and adduction are 5°. The patient walks with crutches, needs assistance of others. Atrophy of femoral muscles is observed, shortening of healthy inferior limb by 5 cm owing to pelvis disalignment.

Evaluation of the functional state of the hip joint by our 12 scoring method reached 6 points before surgery. Sign of left hip joint space narrowing is visible on radiographs, lateraloproximal segment of the head is destructed, high-grade osteoporosis revealed. Left hip replacement was performed in 2015 with the cemented endoprosthesis.

1



2

Figure 1, 2. Roentgenograph before and after treatment

After 12 months from the surgery the patient walks without assistance, motions in right hip joint are in full. Flexion in the hip joint is 90°, extension is 180°, abduction and adduction are 15°, all movements are painless. Long distance walks do not require additional support.

Evaluation of functional state of hip joint after surgery was 10 points. Evaluation of functional state of hip joint is qualified as good. This patient is to have the left hip replacement for full satisfaction of treatment.

Thus rheumatoid coxitis depending on clinical signs has four stages, and also characteristics of pain, limiting of flexion, extension, abduction and adduction, reduction of hip muscles force with changes of rising from "semi-erect" position and rising/sitting down, walking speed and decreasing of daily life activity.

Conclusions:

1. Clinical symptoms of rheumatoid coxitis have 4 stages.
2. Severity of clinical signs depends from stage of disease.
3. Rheumatoid coxitis of stage III and IV leads to profound disability and becomes an indication to the replacement of the hip.

References:

1. Marinus D.J. Stowers, Daniel P Lemanu, Brendan Coleman, Andrew G Hill, Jacob T Munro (2014) Review Article: Perioperative care in enhanced recovery for total hip and knee arthroplasty. Journal of Orthopaedic Surgery – 2014; – 22 (3):383–92.
2. Svege Ida, Nordsletten Lars, Fernandes Linda, May Arna Risberg (2015) Extended report: Exercise therapy may postpone total hip replacement surgery in patients with hip osteoarthritis: a long-term follow-up of a randomised trial. Ann Rheum Dis – 2015; – 74:1; – 164–169.
3. Peter W. F., Tilbury C., Tordoir R., Verdegaal S. H., Onstenk R., Benard M., Vehmeijer S. B., Van der Linden-Zwaag E. M., Nelissen R. G., VlietVlieland T. P. (2013) Preoperative physical therapy in total hip and knee replacement surgery: a multi center study. Ann Rheum Dis – 2013; 72: Suppl 3 A 578.
4. Hoeksma H. L., Van den Ende C H M, Ronday H. K., Heering A., Breedveld F. C., Dekker J. (2003) Comparison of the responsiveness of the Harris Hip Score with generic measures for hipfunction in osteoarthritis of the hip. Ann Rheum Dis – 2003; – 62:10; – 935–938.
5. Pisters M. F., Veenhof C., Schellevis F. G., et al. (2010) Long-term effectiveness of exercise therapy in patients with osteoarthritis of the hip or knee: a randomized controlled trial comparing two different physical therapy interventions. Osteoarthritis Cartilage – 2010; – 18:1019–26.
6. Beumer L., Wong J., Warden S. J., Kemp J. L., Foster P., Crossley K. M. (2016) Effects of exercise and manual therapy on pain associated with hip osteoarthritis: a systematic review and meta-analysis. British Journal Sports. Med. – April 1, – 2016. – 50 (8); – 458–463,
7. Dasgupta B., Hutchings A., Hollywood J., et al. (2006) Clinical outcomes, quality of life and diagnostic uncertainty in the first year in polymyalgia rheumatica: a prospective cohort study. Rheumatology – 2006; – 45 (Suppl 1): i170.
8. Bilsel N. et al. (2008) Long-term results of total hip arthroplasty in patients with juvenile rheumatoid arthritis. Acta Orthop. Traumatol. Turc. – 2008. – Vol. 42 (Suppl. 2). – P. 119–124.
9. Heiberg K.E,. (2015) Exercise, Recovery of Physical Functioning, and Prediction of Physical Activity After Total Hip Ar-throplasty. 5-Year Follow-Up of a RCT. Annals of the Rheumatic Diseases, – 2015. – Vol. 74 issue 2. – P. 1318–1319.
10. Leichtenberg C., et al. (2015). Determinants of Returning to Work 12 Months After Total Joint Surgery: Differences Between Total Hip Arthroplasty and Total Knee Arthroplasty/C. Leichtenberg et al.//Annals of the Rheumatic Diseases, – 2015. – Vol. 74. issue 2. – P. 1182–1183.

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Genetic polymorphism of coagulation factors in patients with retinal vein thrombosis

Abstract: The frequency of genetic polymorphism of coagulation factors in patients with retinal vein thrombosis was investigated.) The study revealed the prevalence of homozygous genotype "T677T MTHFR gene" in the main group of patients and higher rate of incidence in men than in women.

Keywords: genetic polymorphism, allele, genotype, retinal vein thrombosis.

Relevance. Thrombosis of retinal veins represent about 60% of all acute vascular pathology of the eye, are in second place after severity of diabetic retinopathy by retinal lesions and prognosis [1; 2].

Among the risk factors for retinal vein thrombosis, are the most important changes of hemodynamic and hemo-rheological factors: local damage to the vascular wall, leading to the changes of the local coagulation potential; hereditary and acquired disorders in a variety of hemostasis [3; 4].

The issues of homeostasis are attractive for researchers, in order to detect risk factors of thrombosis. Normally, platelets circulate in the blood in an inactive state, and their interaction with intact endothelium lining the blood vessels is quite limited. Only damage to the vessel wall triggers a cascade of processes leading to the formation of a blood clot from platelets and fibrin. However, there are situations where the platelets exert their activity in the bloodstream without a stimulus. This causes an increased risk of thrombosis — platelet thrombophilia.

Depending on pathology of hemostasis components, promoting thrombosis, there are three types of thrombophilia: platelet, vascular and plasma [5; 6; 7]. Verification of the type of thrombophilia is extremely important to optimize the therapy.

According to above stated, there is an urgent need to study the pathogenesis of thrombotic disorders, the development and introduction of molecular methods to identify the genetic disorders, and evaluate the role of genetic markers in predicting the development of retinal vein thrombosis. This will improve the patient examination protocol and adequately verify the risk of progressing the disease, select rational preventive therapy, which in turn contributes to the prevention of severe ophthalmic conditions leading to visual impairment and blindness.

The purpose of research — to study the features of the distribution of alleles and genotypes of polymorphism G20210A prothrombin gene, the FV gene (G1691A) and methyltetrahydrofolatereductase gene (MTHFR) (C677T) in patients with retinal vein thrombosis.

Materials and methods. The frequency of genetic polymorphisms, associated with thrombophilia, was studied among the local population.

The study included 152 patients with central retinal vein thrombosis and its branches, there were –83men (54.6%), women — 69 (45.4%) aged from 35 to 80 years old. The average age of patients was 61.2 years±2.4 years. Thrombosis of the central retinal vein (CRVO) was observed in74 (48.7%) patients and thrombosis (occlussion) of its branches (BRVO) — at 78 (51.3%) patients. Ischemic type of CRVO and its branches thrombosis occurred in 59.2% of cases, non-ischemic type- in 62 patients. The control group included 156 healthy individuals who had no eye disease without thrombotic history.

All the investigated individuals have passed the standard ophthalmic methods of examination.

In addition, as genetic markers of thrombophilia evaluated G1691A mutation in Factor V clotting (V Leiden Factor), G20210A protrotrombina gene, C677T gene in MTHFR. We used the method of polymerase chain reaction with carrying out restriction analysis of amplified DNA segments. The study of genetic markers was conducted in a group of patients (152) and the control group (156 apparently healthy individuals), matched by sex and age. The study of group members hipper formed by using monoclonal antibodies with standard methods.

The results were processed using statistical software for Windows — STATISTICA (version 10). For calculations the package of the application programs "Open Epi 2009, Version 2.3" is used.

Results and discussion. As a result of research to 156 donors one man was found to have quite low mutation frequency (G20210 A) FII gene (0.6%), indicating a low incidence of this marker in the local population.

Table 1. – The distribution of alleles and genotypes of polymorphism FII among patients with retinal vein thrombosis and control group

Groups	n	Allele frequency		Frequency of genotype distribution					
		G	A	G/G		G/A		A/A	
		%	%	n	%	n	%	n	%
Main group	152	99	1	149	98	3	2	0	0
Men	83	99,4	0,6	82	98,8	2	1,3	0	0
Women	69	99,3	0,7	68	98,6	1	0,7	0	0
Control	156	99,7	0,3	155	99,4	1	0,6	0	0
Men	79	99,7	0,3	78	99,4	1	0,6	0	0
Women	77	49,4	0	77	49,4	0	0	0	0

In the main group among 152 patients with a mutant allele of blood coagulation FII was detected in three cases (2%). The frequency of mutant alleles of the polymorphism studied in patients and healthy donors was 1% and 0.3%, respectively (X2 = 0.4, P = 0.5; OR = 2.1; 95% CI 0,1867–23, 18). The chance of thrombosis in carriers of this allele in the main group was 2.1 times higher than the control group. At the same time, the distribution of the frequency of heterozygous carriers among the patients and the control group was 2% and 0.6%, respectively. Homozygous genotype of this polymorphism was not detected in both groups.

Assessment of features of the distribution of genotypes and allelic variants of the G20210A prothrombin gene in patients with retinal vein thrombosis according to gender demonstrated that the risk of thrombosis in carriers of the men was higher than that of females (X2 = 0.02; P = 0, 2; OR = 0.8; 95% CI 0,1867–23,18). It must be emphasized that the chance of developing retinal thrombosis among men was slightly higher, but this difference was not statistically significant.

Out of all examined 156 apparently healthy donors, mutant allele — Leiden factor gene was detected in 5 cases (3.2%), carriage of this gene was only heterozygous mutations and homozygous mutations was not detected in the study group.

Out of the surveyed 152 patients with retinal vein thrombosis 8 patients were carriers of mutant alleles in the gene 1691A factor FV clotting in heterozygous state (5.3%), which corresponded to 1.7 fold increase the risk of venous thrombosis (p> 0,05, OR = 1.7) compared with the control group (3.2%).

The frequency of mutant 1691A allele of factor V Leiden in the patients examined by gender, men and women, was respectively 2.4% and 2.9%. Among women the presence of FV genotype G1691A genotype detected in 5.8% of cases, and in the group of male patients — 4.8%. Comparative analysis of the prevalence of alleles and genotypes according to gender among patients with retinal vein thrombosis did not reveal much difference of FV (G1691A) polymorphism.

Table 2. – Distribution of allele and genotype polymorphism of G1691A of FV gene in patients with retinal vein thrombosis and control groups

Groups	n	Allele frequency		Frequency of genotype distribution					
		G	A	A/A		G/A		G/G	
		%	%	n	%	n	%	n	%
Main group	152	2,7	97,3	144	94.7	8	5,3	0	0
Men	83	1,4	57,7	79	52%	4	2,75	0	0
Women	69	1,3	39,6	65	42,7	4	2,75	0	0
Control	156	1,6	8,4	151	96,8	5	3,2	0	0
Men	79	0,9	49,7	76	48,7	3	1,9	0	0
Women	77	0,7	48,7	75	48,1	2	1,3	0	0

Table 3. – Distribution of allele and genotype of MTHFR polymorphism among patients with retinal vein thrombosis and control group

Groups	n	Allele frequency		Frequency of genotype distribution					
		C	T	C/C		C/T		T/T	
		%	%	n	%	n	%	n	%
Main group	152	79,6	20,4	100	65,8	42	27,6	10	6,6
Men	83	76.0	24.0	52	62,7	22	26,5	9	10,8
Women	69	84,1	15,9	48	69,6	20	29.0	1	1,4
Control	156	88,8	11,2	124	79,5	29	18,6	3	1,9
Men	79	86,7	13,3	59	74,7	19	24.0	1	1,3
Women	77	90,9	9,1	65	84,4	10	13	2	2,6

Methyltetrahydrofolatereductase gene mutation (MTHFR) (C677T) was the most frequently identified, both among patients and among healthy individuals. Thus, among the surveyed152, 42 persons were found carriers of mutation C677T MTHFR gene. Distribution of 677T and 677C allele in the control group (156) correspond to the numbers of 0.8 (79.6%) and 0.2 (20.4%), respectively. The overall incidence of C677T MTHFR gene mutation incidence among the control group was 0.32 (32%). 29.0% of them were heterozygous and only 3.0% homozygous genotype.

The frequency of mutant allele carriers 677T (hetero and homozygous) in the total group of patients is 34.2%. According to calculated chances of ratio coefficientcorresponded to more than two times (P <0.05; OR = 2.1).

Comparative analysis of the distribution of genotypes (C/C, C/T and T/T) MTHFR gene showed that the proportion of individuals with a homozygous mutant genotype "T677T" among patients almost 3.5 times higher than that in the control group, the data is statistically reliable (6.6% against 1.9% in control, p<0,04, OR = 3,6).

Significant predominance (p <0.04) of the number of carriers of the homozygous genotype "T677T" in patients with retinal vein thrombosis may indicate the presence of a pathogenic connection, ie, the association between this kind of genotype with cases of thrombosis.

It was found that mutant allele (677T) MTHFR gene reveals 24% more often in men than in women (15,9%) and the figure for this gene among the control group was 11,2%.

The analysis of the frequency of homozygous genotype polymorphism C677T MTHFR gene in the group of patients demonstrates that among men the frequency of the mutant allele T/T is very high at 10.8%, which is 7,7 times more likely than in women (1,4%) and 5,7 times more than in the control group (1,9%).

Analysis of the distribution of genotypes of DNA polymorphisms, depending on the gender of the patient revealed a number of differences. Statistically significant prevalence of "T677T" MTHFR gene carriers in a group of males (χ^2 = 6.4; P = 0,02; OR = 8,3; 95% CI 1.021, 66.9) with retinal vein thrombosis was revealed. In the group of women patients, carrier heterozygous genotype "C/T" (28% against 26,5%) determined more than in men. In the control group of men with heterozygous carriage type "C/T" was 1.8 times more than women, but the differences were not significant (χ^2 = 0,4; P = 0,5; OR = 0,5; 95% CI 0.0427, 5.413).

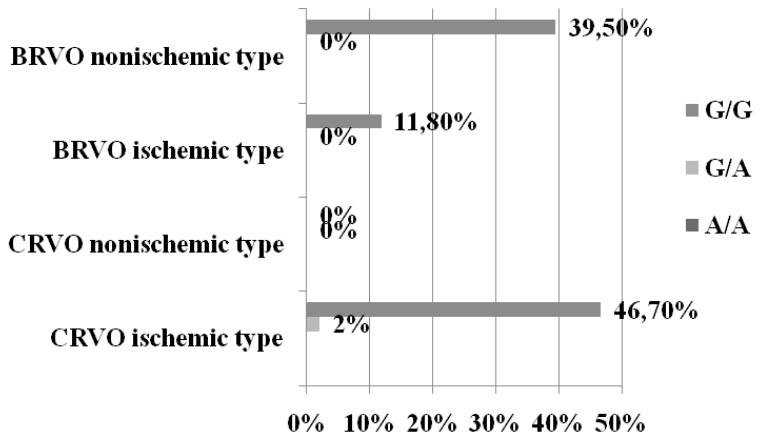

Figure 1. Frequency distribution of genotypes of factor FII in subgroups of patients with retinal vein thrombosis

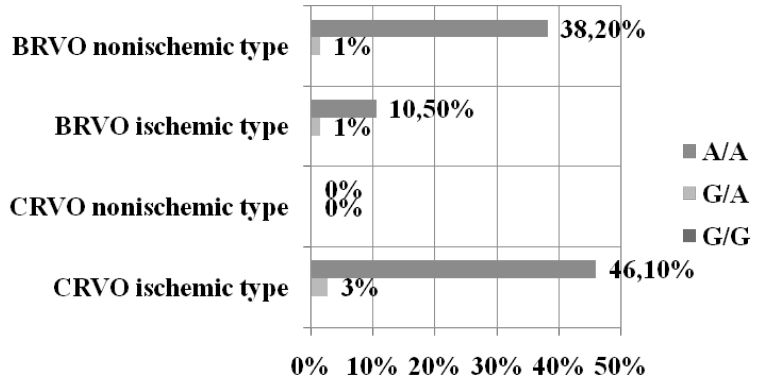

Figure 2. Frequency distribution of genotypes of factor FV in subgroups of patients with retinal vein thrombosis

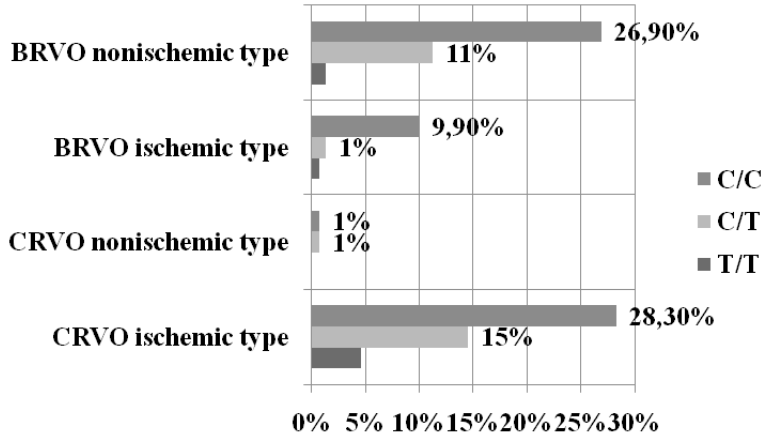

Figure 3. Frequency distribution of MTHFR genotypes in subgroups of patients with retinal vein thrombosis

Studies have revealed the presence of homozygous genotype of MTHFR factor. Homozygous genotype of "T677T MTHFR gene" is more common in the subgroup of patients with ischemic type of CRVO (central vein retinal occlusion)- 4.6%, in the subgroup of patients with nonischemic type of CRVO — 1.3% and ischemic type of branch retinal vein occlusion (BRVO) — 0, 65%.

The homozygous genotype G1691A FV and FII genes of blood coagulation were not observed in patients of the main group.

Conclusions: 1. The results of studies show that carriers of mutant alleles of FII gene and mutant alleles of the gene FV factor are out of risk of thrombosis.

2. Homozygous genotype of "MTHFR gene T677T" often prevails in the subgroup of patients with ischemic type of CRVO — 4.6%.

3. Statistical analysis revealed a predominance of homozygous genotype of "T677T MTHFR gene" in the main group of patients. The risk of retinal vein thrombosis in carriers of this genotype is 3,5 times higher than in individuals without this genotype ($\chi^2 = 4.1$; P = 0.04; OR = 3.5; 95% CI 0.9689, 13.31).

4. The frequency of "T677T MTHFR gene" genotype was 8.3 times more common in males compared with the females ($\chi^2 = 6.4$; P = 0.02; OR = 8.3; 95% CI 1.021–66.9).

References:

1. Tankovskiy V. E. Retinal vein thrombosis. – M., 4-йфилиал Milit.pub, – 2000. – 262 p.
2. Katsnelson L. A. Vascular eye diseases./L. A. Katsnelson T. I. Forofonova A.Ya. Bunin. – M.: Medicine. – 1990. – 270 p.
3. Tultseva S. N. Retinal vein occlusion (etiology, pathogenesis, clinical manifestations, diagnosis, treatment)/S. N. Tultseva, Yu. S. Astakhov. – Sankt-P.: N-L pub. – 2010. – 112 p.
4. Astakhov Yu. S. Retinal vein thrombosis: etiology, pathogenesis, clinical manifestations, diagnosis, treatment/Yu. S. Astakhov, N. N. Petrishev, S. N. Tultseva//Manual for physicians. – Sankt-P.: S-Pt MU, – 2005. – 60 p.
5. Lisenko V. S. Thrombocytopathy and its role in hemorrhagic syndrome at vascular eye diseases/V. S. Lisenko, A. I. Mukha, A. Ya.Buninet al.//Journal of ophthalmology. – 2001. – No 1. – P. 24–26.
6. Astakhov Yu. S. Thrombophilia in pathogenesis of retinal vein thrombosis. Yu. S. Astakhov, N. N. Petrishev, T. S. Varganov, S. N. Tultseva//Journal of ophthalmology. – 2008. – No 3. – P. 56–58.
7. BombeliT., Basic A., Fehr J. Prevalence of hereditary thrombophilia in patients with thrombosis in different venous systems. Am. J. Hematol. – 2002; 70: – P.126–132.
8. Khan S., Dickerman J. D. Hereditary thrombophilia//Thrombosis J. – 2006. – V. 4. – No 15. – P. 35–40.
9. Doix S., Mahrousseh M., Jolak M. e. a. Factor V Leiden and myocardial infarction: a case, review of the literature with a meta-analysis//Ann CardiolAngeiol (Paris). – 2003. – V. 52, – N 3. – P. 143–149.
10. Kim R.J, Becker R. C. Association between factor V Leiden, prothrombin G20210A, and methylenetetrahydrofolatereductase C677T mutations and events of the arterial circulatory system: a meta-analysis of published studies. Am Heart J. – 2003 Dec; – 146 (6): – 948–57. Review.

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The analysis of results the ventricular shunting of operations at the children with congenital spinal hernias combined with hydrocephaly

Abstract: Treatment of spinal hernias in a combination to a hydrocephaly presents great difficulties. At patients with the spinal hernias which are combined with a hydrocephaly carrying out a ventrikuloperitoneostomy with the first stage promoted decrease of the sizes of a hernial diverticulum with development of cover tissues for the subsequent plasty of hernia.

Keywords: spinal hernia, hydrocephaly, ventricular perithoneostomy operation.

Spinal cord hernias (SCH) which are combined with hydrocephaly meet quite often and fluctuate within 30–80% [1, 9–14]. According to results of the conducted researches in our country and abroad the frequency of a congenital hydrocephaly makes 3–4 cases on 1000 live-born, and SCH makes 1:1000 — the 5000th population [3, 6–9]. Hydrocephaly most SCH frequent satellite which is making heavier the forecast of a disease, and also quite often developing after elimination of hernia [5, 361]. At patients from SCH existence of a hydrocephaly burdens a clinical picture of a disease. Cognitive deficiency arises more often at children with SCH the combined hydrocephaly. Level of mental development is directly bound to the sizes of side ventricles (hydrocephaly degree) and rates of their decrease in the postoperative period [2, 1–6]. It is claimed that it is the serious contingent of patients as they have a very expressed neurologic symptomology, lag in psychomotoric and physical development, and also a combination of spinal hernia and a hydrocephaly to other malformations [7, 36].

Treatment of SH in combination with a hydrocephaly presents great difficulties, and usually it doesn't limited by surgical correction, effective at some the isolated defects. Surgical tactics in such cases means solving not only a question of a plastics of a hernial gate, but also a question of correction of the accompanying hydrocephaly [6, 382]. For purposeful surgical treatment of a hydrocephaly it is necessary to know a form of a hydrocephaly and a stage of its current, and also a combination to other pathology the cerebrospinal fluid (CSF) of ways of a brain [4, 3]. Hydrocephaly meets mainly at open forms of dysraphias (spina bifida opperta), and before introduction the ventricular shunting operations (VSO), it was the leading cause of death and low intellectual development of these children. After VSO the condition of the patient in most cases becomes steadily shunting dependent, at the same time every third patient demands audit of the shunting system. More often dysfunction arises within the first year from the moment of primary operation, at the same patients the high risk of repeated dysfunction within a year after audit becomes perceptible [8, 345]. Use of advanced trial and error methods of parameters of the systems implanted the ventricular shunting at VSO gives a high probability of achievement of adequate control over a hydrocephaly, depressions of frequency of development of postoperative hypo drainage and hyper drainage states.

Research objective: To compare results of the ventricular shunting operations at patients with the congenital spinal hernias which are combined with a hydrocephaly with use and without use of the cerebrospinal dynamic test.

Research materials. Scientific work is performed in unit of neurosurgery of children's age of Republican scientific center of neurosurgery of MH of RUz. The analysis of 72 children treated in RSCNS with SCH which are combined with a hydrocephaly is carried out. Were examined boys — 41 (56,9%), girls — 31 (43,1%), at the same time the age of children varied from 24 days from the moment of the birth up to 7 years of life. All patient carried out MRI, CT, a neurosonography (NSG), ENMG, a clinical-neurologic research which are made before and in the postoperative period.

The combination of all-brain and focal syndrome complex was characteristic of children with SCH which are combined with hydrocephaly, at the same time character of a neurologic deficit differed in variety. The clinic from a spinal disraphy was generally characterized by motive, sensitive and pelvic disorders. From a brain the following changes were marked: the positive symptom of the setting sun — at 46 (63,8%), the meeting squint — at 13 (18%), the dispersing squint — at 3 (4,2%), looking paresis — at 2 (2,8%) and a deficit in the form of lowering pharyngeal reflex and a choke when swallowing — at 2 (2,8%) patients. From an eye bottom the angiopathy of a retina is revealed — at 60 (83,3%), an initial atrophy of a disk of an optic nerve — at 2 (2,8%) patients, stagnation of DNO — at 10 (13,9%) patients.

Two-stage operation is made: ventricular shunting operation (VSO) — a ventricular perithoneostomy (VPS) and a herniotomy. For the purpose of selection of parameters of the shunting systems we used the computer program "Liquorodynamic Test" (Akhmediyev M.M., I.A. Yugay, Makhmudov Sh.D., No. DGU 01982, 2010 of) which is developed in RSC of NS. The program works at a basis of an algorithm of exceeding of average arithmetical between indices of change of CSF pressure during fractional deduction of a CSF. The program has the convenient interface and a possibility of database maintenance. Process of the analysis of got data, a finite output and selection of the shunting system is carried out automatically. All patients were distributed on 2 groups: First (main) group: children to whom VPS using the CSF dynamic test — 36 (50%) is carried out by the patient. The second (control) group was made by patients to whom valvate systems without carrying out this method — 36 (50%) patients are installed.

Results of a research. The task in which we shall determine what transaction, and when to make, whether it is a herniotomy

or VPS was set. At the same time a number of factors including a general somatic condition of the patient was considered: form, sizes of a circle of the head and hernia, condition of integuments of hernial protrusion, progression of a hypertension-hydrocephalic syndrome, high-quality and quantitative composition of CSF and elements of blood. The type and a staging of transaction are shown in table 1.

Table 1. – Type and staging of the performed operations in case of spinal hernias combined with hydrocephaly

Type of operational intervention	Primary group N=36		Control group N=36	
	Абс.	%±m	Абс.	%±m
Ventricular perithoneostomy 1-step	33	91,7±4,6	28	77,8 ±6,9
Ventricular perithoneostomy 2nd step	3	8,3±4,6	8	22,2±6,9
In total the shunting transactions	36	100	36	100
Herniotomy	35	97,2±2,7	34	94,4 ±3,8
Totally	36	100	36	100

From table 1 it is seen that at all 72 patients VSO is made. In a primary group of VPS is made: the first stage — at 33 (91,7%) patients, the second stage, after a herniotomy — at 3 (8,3%) patients. In the VPS control group is made: the first stage — at 28 (77,8%) patients, the second stage — at 8 (22,2%) patients.

After carrying out the first stage VPS happened both regress the hydrocephalic symptomology, and removal of threat of a gap of hernial protrusion to its reduction, and also improvement in psychomotor development was noted that is important for further adaptation to life of such patients. (Fig 1.)

before & after operation

Figure 1. A status of a hernial bag before and after shunting operation

In figure 1 the hernial bag before the shunting operation where clearly is visible that hernial protrusion decreased in the amount is provided.

At 2 (2,8%) patients combined with Chiari's syndrome, regress stem symptoms after shunting operations were marked. It is defined that at patients with SCH which is combined with hydrocephaly it is necessary to carry out at the first stage surgical treatment in the form of VPS whereas the moderated and not progressing ventriculomegaly and absence of signs of increase in intra cranial pressure give the chance to delay ventricularshunting operation or even to postpone it. Arguments in favor of shunting are normalization of intracranial pressure, removal of threat of a gap, improving of psychomotor and intellectual development of the child, lowering of frequency of the inflammatory phenomena, smaller frequency of CSF from hernia. Tactics choice in favor of carrying out the first stage of a herniotomy are existence of deformation of ventricular system and a ventricular dilatation, but at the same time absence of signs of increase in ICP and the progressing hydrocephaly.

Determination of parameters of the installed shunting systems was result of application of the CSF dynamic Test program. Distribution of patients on the level of correction of pressure are shown by the valvate shunting systems in table 2.

Table 2. – Distribution of patients on the level of correction of pressure by valvate shunting systems

Pressure	Groups				Total, n=72	
	Main, n=36		Controlling, n=36			
	Abs.	%±m	Abs.	%±m	Abs.	%±m
High	2	5,5±3,8	1	2,8 ±2,7	3	4,1±2,3
Average	9	25 ±7,2	18	50 ±8,3	27	37,5±5,7
Low	24	66,7±7,8	17	47,2± 8,3	41	56,9±5,8
Too low	1	2,8 ±2,7	–	–	1	1,4±1,4
Totally	36	100	36	100	72	100

From table 2 it is seen that at patients of the main group according to the CSF dynamic test the percent of installation of the shunting systems of extreme indices increased: at 2 (5,5%) patients — high pressure, at 24 (66,7%) patients — low pressure, and at one patient is very low pressure.

Implantation of constant valvate systems using the CSF dynamic test allowed to improve results of surgical treatment of SCH which are combined with hydrocephaly. The positive effect of the carried-out VSO was estimated on regress of a hydrocephalic syndrome and improving of the neurologic status. (Table 3).

Table 3. – The comparative characteristic of results of VSO using the cerebrospinal fluid dynamic test

Sign	1 group with application of the program cerebrospinal fluid dynamic test				2 group without application of the program the cerebrospinal fluid dynamic test				T differences
	Improvement		Without changes		Improvement		Without changes		
	Abs	%	Abs	%	Abs	%	Abs	%	
Hydrocephalic syndrome	33	91,7±4,6	3	8,3±4,6	30	83,3±6,2	6	16,7±6,2	P<
Oculomotoric violations	19	52,8±8,3	2	5,5±3,8	18	50,0±8,3	4	11,1±5,2	P<
Reduction tension of a big fontanel	32	88,9±5,2	4	11,1±5,2	28	77,8±6,9	8	22,2±6,9	P<
Reduction tension of a hernial bag	30	83,3±6,2	3	8,3±4,6	20	55,5±8,3	8	22,2±6,9	P<

Proceeding, from data of table 3 it is possible to draw a conclusion that application of the CSF dynamic test has considerably improved results of VSO in comparison with control group of patients which had a similar pathology.

Proceeding from it, it is possible to draw a conclusion that the program cerebrospinal fluid dynamic test when carrying out VSO improves dynamics of such indicators as regress of a hydrocephalic syndrome, regress of oculomotoric violations, reduction of tension of a big fontanel and reduction of a hernial bag in 1,1; 1,05; 1,14 and 1,5 times ($\rho \leq 0,05$) respectively. The analysis of the complications observed by us in two groups of patients after the shunting operations (table 4) is presented in the table below.

Table 4. – The comparative characteristic of hypo- or hyper drainage complications after VSO in 2 groups depending on application of CSFDT

Disfunction	1 group with application of the CSFDT		2 program group without application of the CSFDT program	
	Abs	%	Abs	%
Hypodrainage	2	5,5%	4	11,1%
Hyperdrainage	–	–	1	2,8%
Total	2	5,5%	5	13,9%

From table 4 it follows that adequate selection led the parameter of the shunt to reduction hypo — and hyper drainage complications in the main group of patients. The complications connected with inadequate selection of the shunting systems in control group were observed 2,5 times more than in the main group.

Thus, the computer program «Hyper drainage dynamic Test» has improved results of surgical treatment of patients with the spinal hernias which are combined with hydrocephaly.

Conclusions: 1. Application of the Hyper drainage dynamic Test program has given the chance rather precisely to determine the parameter of the implanted shunting systems for adequate correction of the hydrocephaly making difficult the flow of SCH at children.

2. Application of the Hyper drainage dynamic Test program has raised the favorable result of treatment of hydrocephaly at patients with SCH, has improved a condition of patients on such indicators as regress of a hydrocephalic syndrome, regress of oculomotoric violations, reduction of tension of a big fontanel and reduction of a hernial bag in 1,1; 1,05; 1,14 and 1,5 times ($\rho \leq 0,05$) respectively. Decrease in probability of development hypo — or hyper drainage complications after VSO by 2,5 times is noted.

References:

1. Adzick N. S. Fetal myelomeningocele: natural history, pathophysiology, and in-utero intervention/N.S Adzick//Semin Fetal Neonatal Med. – 2010. – Feb; – 15 (1): – 9–14.
2. Anderson H.A, Stuebing KK, Buncic R. Factors Associated With Strabismus in Spina Bifida Myelomeningocele//J Pediatr Ophthalmol Strabismus. – 2012. – May 8. – P. 1–6.
3. Boczar M. How did the procedure during the first stage of surgical treatment change. Analysis of two groups of patients treated in the years – 1986–1992 and – 1999–2005. – Oct-Dec; – 13 (4): 6–9.
4. Communarov V. V. "The choice of parameters of the implanted drainage system in treatment of a hydrocephalus"//the Autoref. yew. edging. medical sciences, SPb. – 2003. – P. 3.
5. Elikbayev G. M. Clinical implications of spinal hernias at children.//Polenevsky readings materials 10 of an anniversary All-Russian scientific and practical conference. St. Petersburg – 2011. – P. 361.
6. Fatkhutdinova N. T., Gizatulin M. R., Kotrikov E. B., Nigmatullin K. R., Tazetdinov G. V./Dysfunction of the shunting system//Materials X of an anniversary All-Russian scientific and practical conference Polenovsky readings on April – 19–22, – 2011. – P-382.
7. Kuznetsova T. V. Hydrocephalus as satellite of spinal hernia/T. V. Kuznetsova, V. V. Vasilenko, G. A. Dzhanabilov//Physiology, morphology and pathology of the person and animals in the conditions of Kyrgyzstan. – 2008. – No.8. – P. 36.
8. Yugay I. A., Akhmediyev M. M. Correction of craniospinal pressure in treatment of a hydrocephalus combined with spinal hernias.//Materials of the All-Russian scientific and practical conference "IX Polenovsky readings" on – April 6–10, – 2010, – SPb. – P. 345.

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Modern methods of treatment of Polycystic Ovary Syndrome

Abstract: One of the most frequent reasons of infringements of reproductive function and health in women at the reproductive age is polycystic ovary syndrome (PCOS). According to, the given pathology is under steadfast attention of doctors in the various countries, including, and in our republic.

Keywords: Polycystic Ovary Syndrome, drospirenon, reproductive age, hyperandrogenemia.

Introduction. One of the most frequent reasons of infringements of reproductive function and health in women at the reproductive age is polycystic ovary syndrome (PCOS). According to, the given pathology is under steadfast attention of doctors in the various countries, including, and in our republic. For today the problem of protection of reproductive health of the population is high on the list in legislations and policy of modern progressive society and is one of the priority directions in the Republic of Uzbekistan. One of the most frequent reasons of violations of reproductive function and health at women of fertile age is PCOS. [1; 5; 6; 7]. Communications with that, this pathology is under close attention of doctors in various countries, including, and in our republic. At the same time, clinical practice dictates need to give help to the patients suffering from PCOS and to help them with the solution of problems, basic of which, undoubtedly, is infertility [2; 3; 4]. Besides, violation of a menstrual cycle, excess growth of hair, an acne, excess weight are symptoms which are available in various combinations for all patients to PCOS and demand treatment. Unfortunately, questions of quality of life and the state of health of women with PCOS are not investigated adequately. The variety of clinical manifestations of PCOS always caused a set of difficulties at its diagnostics. Therefore, the most reliable criteria of its diagnostics interest obstetricians-gynecologists for this reason certain standards for this pathology are developed. The most significant are the conclusions after the seminars held by European Society of Human Reproduction and Embryology and American Society for Reproductive Medicine in Rotterdam (2003), Thessaloniki (2007), Amsterdam (2010) [6; 7; 8].

Aim: Estimate of clinical efficiency from application of the complex oral contraceptive with the anti-androgenic action containing in the structure drospirenon in treatment of PCOS and also influence on a condition of reproductive health at women with PCOS at women of the reproductive age.

Materials and methods research: We conducted the research devoted to studying of clinical efficiency Jess in treatment of patients with PCOS. The research included 70 patients with PCOS of an androgenic phenotype, ovulate and anovulate genesis (the main group) which selection was made according to the following criteria:

1. Age: the age of patients corresponded to the reproductive period and made 27,3±2,3 years (from 25 to 33 years).

2. Violation of menstrual cycle: in the anamnesis of all patients permanent violations of a menstrual cycle with menarche were noted.

3. Hormonal violations: at a laboratory research the diagnosis of PCOS was verified by criteria in total with increase in a ratio of LG/FSG more than 2,5.

4. Acceptability application Complex Oral Contraception (COC): Contraindications to appointment the COC were absent.

5. Hyperandrogenemia: in all observations external signs of a hyperandrogenemia.

Patients are divided into 2 groups:

1-the group took place from 35 patients who accepted the COC Jess (an ethenylestradiol of 20 mg drospirenon 3 mg).

2-the group took place from the 35th group of patients who Yarin's COC was appointed (an ethenylestradiol of 30 mg drospirenon 3 mg).

For comparison of the hormonal and metabolic status of 20 women of volunteers were included to group control. To all patients appointed a course of treatment medicine Jess (the 1st group) or Yarina (the 2nd group) consisting of 12 cycles on 21 days with 7-day breaks.

The results: The positive clinical effect was reached at 75% of patients against the background of treatment Jess. In 18,8% observations reduction of intensity of growth of hair, but, according to patients, insufficiently expressed was noted. Only at 6,2% of the patient reduction of expressiveness of a girsutizm was not noted, i. e. the effect of therapy was absent. Thus, according to our data, Jess at sick PCOS leads application to improvement of clinical and laboratory symptomatology that is the basis for use of medicine in a complex of treatment of this contingent of patients.

Table 1. – Anthropometrical features at the examined women of reproductive age on (n=60)

Indicators	1 group (n=35)		2 group (n=35)	
	To	After	To	After
weight	67,73±2,6	67,5±3,1	54,6±2,9	55,4±2,7
Body weight index	20,1±1,0	20,3±1,2	20,4±0,75	20,3±0,72

Influence on body weight — one of possible metabolic effects the COC, in particular a progestagen component. According to data of literature, drospirenon in combination with etinilestradioly does not cause an increase in weight.

Results of the analysis of the data obtained by us did not reveal statistically significant difference in indicators of body weight and body weight index before therapy in both clinical groups. The hormonal status of women of reproductive age with PCOS depending on various methods treatment is presented in table 2.

In 1st group concentration of LG decreased to 10,7±0,16^, and in 2nd group to 9,86±0,56, with simultaneous increase in an estradiol in both groups. Concentration of testosterone in 1 group decreased to 0,58±0,02; and in 2 group 0,62±0,05. Considerable decrease in concentration of DGEA-S in 2 group is noted.

Both medicines actively suppress development of gonadotrophins, more LG. The expressed antigonadotrophin action is shown by normalization of a ratio of LG and FSG, reduction of volume of the cages producing androgens in ovaries, improvement of biochemical conditions of activity of follicles of an ovary. Ultrasonic diagnostics bodies of a small pelvis before treatment revealed PCOS at 71% of patients. In 6 months after treatment in both compared groups these changes were not registered.

The anti-androgenic effect is caused by ability of a drospirenon to interact with receptors of androgens as competitive inhibition that provides direct influences on hair follicles and sebaceous glands, bringing in a result to obvious cosmetic result.

Efficiency of the medicine "Jess" in treatment of acne rash and moderate severity it was easy it is comparable with the medicine "Yarina". After 6 months of administration of drugs later in group of women of active reproductive age Jess, expressiveness of acne rash decreased by 53%, and in the group receiving Yarina — 46%. Had side effects as intermenstrual bloody allocations on the first packings Jes 10% of women of reproductive age 1 groups.

Table 2. – A condition of the hormonal status against the background of treatment at the studied groups of women reproductive age with PCOS (n=70)

Indicators	2 group (n=35)		1 group (n=35)		Control group n=20
	To	After	To	After	
FSG	7,0±0,71*	5,8±0,11	5,98±1,1	5,5±0,13	5,6±0,15
LG	29,4±4,8*	10,7±0,16^	17,63±1,2*	9,86±0,56	11,6±0,11
E2	53,1±9,9*	63,9±5,2	64,9±4,5	69,3±1,79	75,81±4,5
Prolactinum	16,1±1,63	11,2±0,41^	61,0±21,*3	20,5±2,19^*	12,9±2,2
Testosterone	1,1±0,10*	0,58±0,02^*	1,15±0,18*	0,62±0,05^*	0,50±0,02
DGEA-S	1,5±0,09	1,6±0,17	2,5±0,25*	1,3±0,28^	1,29±0,19
Cortisol	163,3±34,2	169,5±13,1	130,24±9,1*	166,4±15,5^	172,2±20,5

*Note: * — reliability of data in comparison with control group (P <0,05–0,01); ^ — reliability of data after treatment (P <0,05–0,01)*

Thus, generalization of results of the carried-out analysis allow to conclude that both medicines are effective in treatment of women of reproductive age with PCOS. Clinical anti-androgenic efficiency is slightly higher at appointment 0.03 etinilestradiol in combination with drospirenony. Influence on hormonal indicators (bystry decrease in the LG level, testosterone normalization) is identical in both clinical groups.

Conclusion: Thus, anti-androgenic properties of Dzhessa are confirmed in clinical trials and allow to recommend this hormonal medicine and as contraceptive means with favorable additional properties, and as remedy at a functional ovary hyperandrogenemia.

1. For treatment of SPKYa and correction of a giperandrogeniya, and also improvement the condition of reproductive health at women with SPKYa by an androgen phenotype as well as ovulate and anovulate genesis by medicine of the choice is the COOK consisting of gestagen structure drospirenon.

2. In quality the COC, containing drospirenon (gestogen) the most optimum and clinically effective is Jess containing 30 mkg an ethenylestradiol and 20 mg drospirenon.

3. Jess has to be appointed in the faltering mode (7 day) during up to 12 months.

References:

1. Dekdova I. I., Melnichenko of HECTARE. Syndrome of polycystous ovaries: Rukokvodstvo for doctors/Under the editorship of – M.: OOO "Mekditsinsky News Agency", – 2007. – 386 P.
2. Grandfathers I. I., Melnichenko G. A., Fadeyev of V. V. Endokrinologiya: Textbook. – Moscow: Medicine, – 2000. – 632 p.
3. Manukhin I. B., Gevorkyan M. A. Sindrom of polycystous ovaries. – M, – 2004.
4. Shilin of E. "Syndrome of polycystous ovaries" International diagnostic консенсус (2003) and modern ideology of therapy.//CONSILIUM–MEDICUM» – Vol. – 06/N 9/2004.
5. The Rotterdam ESHRE/ASRM-Sponsored PCOS consensus workshop group.//Hum Reproduct, – 2004. – 19:41–7, – FertilSteril – 2004; – 81:19–25.
6. The Thessaloniki ESHRE/ASRM-Sponsored PCOS Consensus Workshop Group * – March 2–3, – 2007, Thessaloniki, Greece.
7. Polycystic ovary syndrome and pregnankcy/Sir-Petermann T, Ladr n de Guevara A., Villarroel A. C., Preisler J., Echibur B., Recabarren S. – 2012.
8. Polycystic ovary syndrome: physiopathology review/Fux Otta C., Fiol de Cuneo M., Szafryk de Mereshian P/Rev Fac Cien Med Univ Nac Cordoba. – 2013. – 70 (1):27–30.

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The role of genes enzymes xenobiotics in the mechanisms of formation of heavy severity level of allergic dermatosis

Abstract: The article presents the results of molecular genetic studies of genes of enzymes of biotransformation of xenobiotics in patients with allergic dermatoses. The study involved 88 patients with allergic dermatoses in age from 5 to 67 years. Results studies have shown that patients with allergic dermatoses observed increased incidence of combined null genotype (GSTM10/0 + GSTT10/0) compared to the population sample (6.8% and 4.1 suitability%) The obtained data indicates that of the Uzbek population of individuals with combined null genotype enzyme genes GSTM1 and GSTT1 xenobiotics tend to risk of severe allergic severity.

Keywords: allergic skin diseases, genes of enzymes of biotransformation of xenobiotics, gene polymorphism, clinic.

Allergic dermatosis occupies one of the leading places in structure of the general disease of a skin and hypodermic cellular tissue and makes 56,2% among skin diseases. [Mavlyanova S. Z., 2014, Nazarov A. A. 2008] On the basis of formation of allergic dermatosis lays interaction of various genetic factors with environmental factors. One of the effective approaches to studying of mechanisms of allergic dermatosis development is connected with research of the genes, products which can be expressly or by implication involved in development of the given pathology.

The purpose of our researches is studying of polymorphism of gene enzymes of xenobiotics biotransformation in patients with allergic diseases of a skin.

Material and research methods: Object and subject of research were the patients with allergic dermatosis (AlD), samples of DNA of sick and healthy donors, gluten transfusion genes GSTM1 (1p13.3), GSTT1 (22q11.2).

88 patients have been included in research with AlD at the age from 5 till 67 were observed on the basis of clinic RSSNPMC DandV of MinH of the Republic of Uzbekistan. From them 41 — women, 47 — men. The diagnosis at all patients is confirmed by results of clinical inspection (DISS) and laboratory researches. All patients were surveyed, observed and passed treatment in branch of dermatology RSSNPMC D and V. (DNA) carried out molecular-genetic inspection of biomaterials on the basis of department of molecular medicine and cellular technologies of scientific research institute of haematology and blood transfusion of MinH of the Republic of Uzbekistan.

At carrying out of genetic researches as comparison group population control was used, which has been presented by samples of DNA (n=72) conditionally healthy donors (without any signs of atopic diseases) from bank of DNA of the given department.

The statistical analysis of results is spent with use of a package of statistical programs «OpenEpi 2009, Version 2.3».

Electric phoregramme of genes detection GSTM1 and GSTT1 (459 items н. — gene GSTT1, 375 items н. — β — γλξαθν, 213 о. v. — GSTM1)

Results of research. On age aspect **patients** with AlD up to 14 years old have made — 13, 15–20 year olds — 12, 21–30–17, 31–40 year olds — 12, 41–50–10 and over 50 years old — 24 patients. Under the clinical form allergic dermatosis has been diagnosed accordingly among 88 patients, 49 patients with atopic dermatitis, 28 patients with nettle rush, 11 patients with allergic dertatitis. Taking into account index ДИШС moderate severity level is diagnosed for 10 patients AlD (on the average 24,6±1,8 point) and 78 — heavy severity level (29,3±0,5 point) diseases.

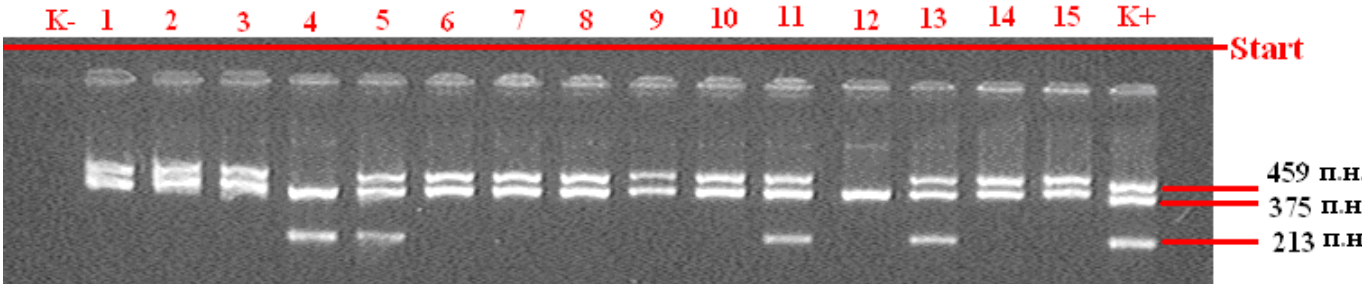

Figure 1. Electric phoregramme of genes detection GSTM1 and GSTT1
(459 items н. — gene GSTT1, 375 items н. — β — globin, 213 о. v. — GSTM1)

The characteristic of a genetic marker and sequence synthesised of oligoprimers are resulted in table 1.

Table 1. – Sequence of oligonucleotides primers used for carrying out ПЦР

№	Gene, localisation	Polymorphism	Structure of oligoprimers
1	GSTM1 (1p13.3)	deletion	F 5-'GAACTCCCTGAAAAGCTAAAGC-3' R 5-'GTTGGGCTCAAATATAGGGTGG-3'
2	GSTT1 (22q11.2)	deletion	F 5 '-TTCCTTACTGGTCCTCACATCTC-3 ' R 5-'TCACCGGATCATGGCCAGCA-3'

Results of molecular-genetic researches of polymorphism of genes enzymes xenobiotics in patients with AlD have revealed certain features of deletional polymorphism GSTM1 and GSTT1 (table 2).

Table 2. – Distribution frequency of alleles and polymorphism genotypes del/del genes GSTM1 and GSTT1 in groups of patients and the control

№	Groups	Frequency of distribution of genotypes							
		GSTM1 «+»		GSTM1 (0/0)		GSTT1 «+»		GSTT1 (0/0)	
		*n	%	*n	%	*n	%	*n	%
1	The basic group N=88	55	62.5	33	37.5	65	73.9	23	26.1
2	Contr. Group n=72	46	64.0	26	36.1	54	75.0	18	25.5

n – number of the surveyed patients;
**n – number of the investigated chromosomes*

Apparently from table 2, in the basic group of patients it was observed the tendency to insignificant increase in frequency of nonfunctional genotype GSTM1 (0/0) in comparison with the control (37,5% against 36,1%) accordingly. The risk of development of AlD in carriers of deletional genotype GSTM1 (0/0) has appeared in 1,1 times above in comparison with the individuals, having functional GSTM1 «+» a genotype. (OR=1.1; 95%CI 0). However calculation of frequencies of distribution of zero genotypes of gene GSTM1 between patients of AlD (the basic group) and the control has shown, statistically not significant distinctions (χ^2=0.3; П =0.1).

At the analysis of frequency of genotypes GSTT1 in group of patients of AlD following features are revealed. So in patients with AlD frequency functional GSTT1 +/+ a genotype in 1,01 times was less in comparison with indicators control healthy group and has made 73,9% in comparison with control healthy group, against 75.0% accordingly. Whereas frequency of zero genotypes GSTT10/0 in group of patients with AlD has made 26,1%, that in 1,1 times was above in comparison with indicators of the healthy faces, however the obtained given indicators did not reach level of statistically significant indicators (χ^2=0.03; P=0.9; OR=1.1; 95% CI0. 0.519 2.169).

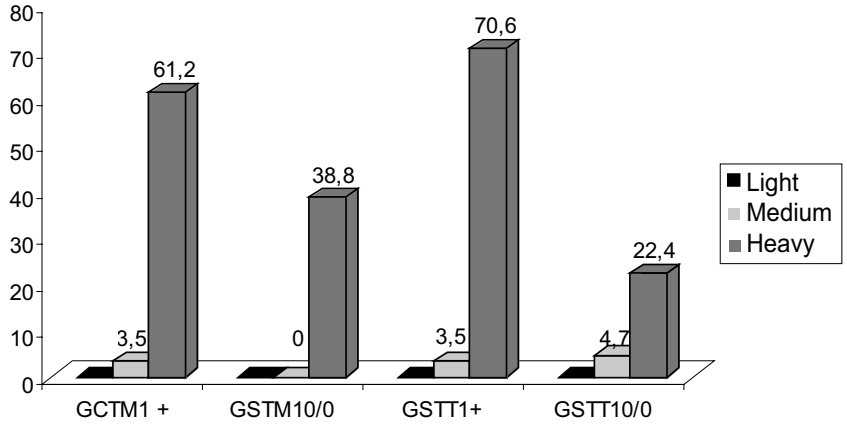

Diagram 1. Indicators of distribution of genotypes ФБК in patients with AlD (%)

So, frequency studying of alleles and genotypes of genes ФБК taking into account severity level of allergic dermatosis drew the following features. (The diagram 1.)

As follows from the diagramme, frequency of functional and zero genotypes GSTM1 and GSTT1 most often came to light in patients with heavy and moderate severity level. Thus it is necessary to notice, that in patients with AlD frequency not functional genotype GSTM1 «0/0» in 38,8% of cases and GSTT1 0/0 = 22,4% of cases basically met in patients from heavy severity level.

The obtained data testifies that deletional polymorphisms GSTM1 and GSTT1 can be independent markers of the raised risk of development of heavy severity level of AlD.

Table 3. – Frequency distribution of combined genotypes of deletional polymorphisms genes GSTM1 and GSTT1 in the investigated groups

	Groups	Frequency of distribution of genotypes							
		GSTM1 0/0 + GSTT1 0/0		GSTM1 0/0 + GSTT1 «+»		GSTT1 0/0 + GSTM1 «+»		GSTM1 «+» + GSTT1 «+»	
		n	%	n	%	n	%	n	%
1	The basic group N=88	6	6,8	27	30,7	17	19,3	38	43,2
2	Contr. Group n=72	3	4.1	24	33.3	14	19.4	31	43.0

*The note: *n — quantity of the surveyed patients*

0/0 + 0/0: χ^2=0.5; P=0.4; OR=1.7; 95%CI 0.4058, 6.979 (there is a tendency).

Heterozygotic genotypes: χ^2=0.1; П =0.9; OR=1.0; 95% CI0.5221, 1.875.

Homozygotic genotypes: χ^2=0.1; П =0.9; OR=1.0; 95% CI 0.5359, 1.885.

Apparently from table 3, among patients with AlD, individuals with combined functionally defective genotypes GSTM10/0+GSTT10/0 met more often, than in group of healthy faces (6,8% against 4,1%, accordingly; χ^2=0.5; P=0.4; OR=1.7; 95%CI 0). The obtained data testifies that individuals with zero genotypes of genes enzymes xenobiotics GSTM1 and GSTT1 have a tendency to risk of allergic dermatosis development. Whereas, in combined variants — zero and functional genotypes of polymorphism of genes GSTM1 and GSTT1 between the investigated groups has not revealed statistically significant distinctions (p> 0.05).

Thus, results of research have shown, that in patients with allergic dermatosis the raised frequency of combined zero genotypes (GSTM10/0 + GSTT10/0) in comparison with population sample (6,8% and 4,1% accordingly) is marked. The obtained data testifies that in Uzbekistan individuals with combined zero genotypes of genes enzymes xenobiotics GSTM1 and GSTT1 have a tendency to risk of development of allergic dermatosis heavy severity level.

Refefrnces:

1. Aliev V. SH. Clinical and molecular-genetic aspects of an allergic rhinitis in Uzbekistan.//the autoreport doc. dissertation. – Tashkent – 2012. – 33 c.
2. Alimhodzhaeva P.R, Karimov H. J., Muminova S. R. System engineering of molecular testing and the analysis of interrelation of polymorphism-590S> T gene IL4 with atopic dermatitis.//medical magazine of Uzbekistan. – No1. – 2012. – 19–21.
3. Bogomazov A. D. Ecological and population-demographic factors and their role in formation of a pathology of the children's population of Kursk area: the autoreport dissertation of medical sciences/Kursk, – 2005. – 22 p.
4. Bochkov N. P. Clinicalal genetics. The textbook. – M: GEOTAR-MED, – 2004. – 408. – 3 p
5. Atopic dermatitis. A management for doctors.//under edition Sergeyeva Y. V. medicine for all. – 2002. – 182.
6. Baranov V.S, Baranova V.E, Ivashchenko T. E., Aseev M. V. Genom of a human and "predisposition" genes: Introduction in predicative medicine. SPb.: Интермедика, – 2000. – 272.
7. Bragin E. Y. comparative analysis of structure hereditary components of susceptibility to a bronchial asthma and tuberculosis on genes of enzymes of a metabolism xenobiotics: Avtorep. dis …. Medical sciences. Tomsk, – 2005. – 23 p.
8. Vavilin V.A, Makarova S. I., Lyahovich V. V., Gavalov S. M. Association of polymorphic genes of enzymes biotransformation of xenobiotics with predisposition to a bronchial asthma at children with hereditary and without that//Genetics. – 2QQ2. – T. 38, – No 4. – P. 539–545.
9. Gavalov S. M., Ryabov O.A, Vavilin V.A, Lyahovich V. V., Makarova S. I. Association of polymorphism of genes of enzymes of biotransformation and detoxication of xenobiotics with features of a bronchial asthma in children//Allergology. – 2000. – No 3. – P. 14–21.
10. Gulyamova G. SH, Mavljanova S. Z., Boboyev K. T. role of a polymorphic variant of a gene of the factor of necrosis a tumour-alpha in development of atopic dermatitis in population of Uzbekistan.//Clinical dermatology and venereology. – No 4. – 2015. – 14. – P. 79–83.
11. Karimov H. J., Saidov A. B., Boboev K. T., Assesorova Y. Y. and others Fundamental and applied aspects of molecular genetics in medicine./the scientific edition. – Tashkent: ИПТД «Uzbekistan», – 2016–352 p.
12. Lyahovich V. V., Vavilin V.A, Makarova S. I., etc. Role of enzymes of biotransformation ксенобиотиков in predisposition to a bronchial asthma and formation of features of its clinical phenotype//the Bulletin of the Russian Academy of Medical Science. – 2000. – № 12. – S. 36–41.
13. Mavlyanova SH. Z. Atopic Dermatitis.//the Monography. – Tashkent – 2014. – 168p.
14. Abdel-Rahman S., El-Zein R. A., Anwar W. A., Au W. W. A multiplex PCR rocedure for polymorphic analysis of GSTM1 and GSTT1 genes in population studies//Cancer. Lett. – 1996. – Vol. 107. – P. 229–233.
15. Ali-Osman F., Akande O., Antoun G. et al. Molecular cloning, characterisation, and expression in Escherichia coli of full-length cDNAs of three human glutathione S-transferase pi gene variants//J. Biol. Chem. – 1997. – Vol. 272. – P. 10004–10012.
16. Altmuller J., Palmer L. J., Fischer G. et al. Genome wide scans of complex human diseases: true linkage is hard to find//Am. J. Hum. Genet. – 2001. – Vol. 69. – P. 936–950.

17. Altshuler D., Kruglyak L., Lander E. Genetic polymorphisms and disease//N. Engl. J. Med. – 1998. – Vol. 336: – P. 1626.
18. Blumental M. N., Nambudiri K. K., Mendell N. et al. Genetic transmission of serum IgE levels//Am. J. Med. Genet. – 1981. – Vol. 10. – P. 219–228.
19. Gambaro G., Anglani F., D'Angel A. Association studies of genetic polymorphisms and complex disease//Lancet. – 2000. – Vol. 355. – P. 308–311.
20. Hukkanen J. Xenobiotic-metabolizing cytochrome P 450 enzymes in human lung//Acta Univ. Oul. – 2000. – D 621.
21. Intestinal metabolism of xenobiotics. In: Foster A. S. J., Richter E., Lauterbach F., HartmannF. (eds). Stuttgart: Gustav-Fischer Verlag, – 1989.
22. Yang H., Yang S., Liu J. Et al. The association of GSTM1 deletion polymorphism with lung cancer risk in Chinese population: evidence from an updated meta-analysis.//Sci Rep. – 2015. – Mar 23. – 5:9392 (doi: 10.1038/srep 09392)

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Choice of treatment tactics in cases of gastric cancer with liver metastases

Abstract: Currently one of the urgent problems of modern oncology is the treatment of gastric cancer with liver metastases. In this regard, the purpose of this study was to develop the optimal treatment strategy by means of evaluating different treatment approaches in gastric cancer with liver metastasis.

The study included analysis of the immediate and distant results of 74 patients with gastric cancer with liver metastases in the period from 2004 to 2016. The study included only those patients who according to investigations were diagnosed gastric cancer stage T4aN2 M1, and metastatic lesions of one or two segments of one lobe of the liver, the number of metastases 1 to 5 knots. Primary lesions of all patients were resectable, affected regional lymph nodes N2 group.

Finally, in cases of resectable gastric cancer with isolated liver metastases patients require combined surgical treatment, as only surgery increases one-year and three-year survival rates significantly, however, in the absence of possibility of surgical intervention it is recommended to conduct long term endoaortic chemotherapy, which significantly increases the average life expectancy from 8.2 to 11.3 months.

Keywords: gastric cancer, liver metastases, surgical treatment, endoaortic chemotherapy.

Gastric cancer remains one of the most common types of human malignancies. According to Axel E. M. (2012) in 2010, were diagnosed more than 1 million cases. This disease has a high mortality rate (more than 700.000 per year), making it the second cause of death in the structure of cancer mortality after lung cancer [1].

In the Republic of Uzbekistan, gastric cancer occupies the second place after breast cancer. The ratio of men to women is 2:1.

At the present time, the diagnosis and treatment of gastric cancer, as well as tumors of other organs are not unsolvable problem, but the early metastasis of gastric cancer via the lymphogenic and hematogenic ways almost complicates the problem to an unsolvable extent.

According to D. V. Podluzhny up to 87.3% (2002) metastasis in gastric cancer occurs in 80–90% of patients [6]. The most frequent localization of metastases through hematogenous via the portal system, is observed in the liver, more than 42% [3].

Currently one of the urgent problems of modern oncology is the treatment of gastric cancer with liver metastases.

Assessing the forecast, many authors identify the following factors affecting life expectancy: gender, stage of primary tumor, number of liver metastases, the distance from the resection margin to the tumor and the stage of liver metastases [2].

Surgical treatment of liver metastases of gastric cancer still remains the preserve of a small number of surgeons, especially in view of the fact that surgery is associated with massive traumatism, the risk of complications and a high risk of fatality [5].

However, over the past 10–15 years, indications for liver resection regarding metastatic lesions has extended significantly. However, up today there are no clear indications, contra-indications to perform other method of treatment of metastatic lesion of gastric cancer. Still most of the physicians in primary general medical network and even oncologists treat patients as incurable.

Reports devoted to this subject are mostly fragmented, sparse and often controversial.

In this regard, the purpose of this study was to develop the optimal treatment strategy by means of evaluating different treatment approaches in gastric cancer with liver metastasis.

Materials and methods

The study analyzed the immediate and distant results of 74 patients with gastric cancer with liver metastases in the period from 2004 to 2016. The study included only those patients who according to investigations were diagnosed gastric cancer stage

T4aN2 M1, and metastatic lesions of one or two segments of one lobe of the liver, the number of metastases 1 to 5 knots. Primary lesions of all patients were resectable, affected regional lymph nodes N2 group.

To ensure the reliability of the study, patients with multiple and bilateral liver metastases were not included.

Men 49 (66,2%), women 25 (33.8%). Ages ranged from 33 to 74 years. Diagnosis was based on the data of complex investigations including: endoscopic, ultrasound, x-ray, CT, MRI, laparoscopic, clinical, laboratory and morphological data.

By TNM staging VII edition (2010) all patients were recorded T4aN2 M1. The lesions of the left lobe was found in 28 (37.8%) and the lesions of the right lobe in 46 (62,2%) patients. Lesion of one segment in 21 (28,4%) patients, and the metastatic lesion of the two segments in 53 (71,6%) patients. Metastatic nodes with diameters from 0.7 to 2.0 cm were detected in 31 (41,9%) patients and from 2.0 to 3.0 cm in 43 (58,1%) patients.

The diagnosis was morphologically verified in all 74 patients prior to treatment. Of them:

Adenocarcinoma of various differentiation was verified in 59 (79.7%);

Glandular-squamous cell carcinoma in 8 (10,8%);

Squamous cell carcinoma in 3 (4.7%);

Undifferentiated carcinoma in 4 (5.4%).

Depending on the conducted treatment methods the patients were divided as follows:

I. Systemic chemotherapy n=29 (39,2%).

II. Long term endoaortic chemotherapy — 22 (29,7%).

III. Surgerical intervention — 23 (31,1%).

For chemotherapy in the first and second group, was selected DCF scheme, (Docetaxel+ Cisplatin+ Doxorubicin). The dosages of the drugs were prescribed according to instructions. In II group Docetaxel was administered during 4 hours intravenously other drugs 100 mg Cisplatin and Fluorouracil 3 gr. was administered within 72 hours endo-aortic continuously.

In all cases, regardless of the treatment methods prior to administration of Docetaxel were done appropriate premedication with Dexamethasone, and before the introduction of Cisplatin was performed hydrotation up to 1.5–2 liters.

In III group, simultaneously was carried out surgical treatment in the volume of gastrectomy with anatomical resection of the affected segments in 14 (60,8%) patients, and distal subtotal resection with anatomic resection of the affected segments in 9 (39,2%) patients. 3 weeks later after the surgery with a break of 21 day were performed 2 cycles of adjuvant chemotherapy according to the DCF scheme.

The anatomical forms of the growth, localization, histological structure, volume of liver metastases in all 3 groups were practically the same.

To assess the immediate results of I and II groups, where patients got systemic and long term endoaortic chemotherapy, were used WHO recommendations (1970) according to which can be observed one of the following:

Full response — the disappearance of the tumor 100%.

Partial response — reduction of the tumor from 25 to 50% or more.

Stabilization of the process — reducing tumors to 25%.

The progression –increase in tumor more than 75%.

Objective assessment of tumor and metastatic lesions is carried out using modern methods of research.

Criterion for evaluating the immediate results of surgical treatment was the analysis of postoperative complications. Evaluation of the results of groups I and II were carried out after 2 weeks following 2 cycles of treatment.

Results

Conducted research in 3 weeks after a cycle of systemic chemotherapy in group I showed that full response has not occurred in any patient. A partial clinical effect was observed in 41.4 percent (12) patients. Stabilization of the process occurred in 51.7% (15) patients. Progression of disease was diagnosed in 6.2% and (2) patients.

In group II after long term endoaortic chemotherapy as well as in the I group full effect was not observed, partial clinical effect in 63.6% (14) patients, stabilization in 8 (36,4%) cases. The progression was not observed in any patient.

In group III, after carrying out the combined surgery postoperative complications appeared in 26.1% (6) patients. Of these, in 3 cases these were therapeutic complications, failure of the cardiovascular and pulmonary system and in 3 patients surgical complications, namely, bile outflow was — 1, resistant anastomositis of the gastroenteroanastomosis — 1, and a partial wound discrepancy, incomplete eventration — 1. And 1 patient died of massive pulmonary embolism. Mortality was 4.3%.

In group I, in cases of partial clinical effect was recommended to continue the DCF for 2 more cycles, and in cases of stabilization and progression was recommended to change the scheme into Xelox (Xeloda + Oxaliplatin).

In group II also recommended the same scheme, only systematically.

Remission period — increase of the primary tumor or metastatic nodes from the initial state or to the appearance of new metastatic nodes in group I was 1.2+0.3 months in group II 1,6+0,4 months, and in group III, before the onset of new metastatic nodes after resection of the liver was on average 4.2+0.4 months.

In the period of observation for the I and II groups 7 patients, respectively 4 and 3 were also observed severe complications like gastrointestinal bleeding, pyloric stenosis and perforation of a tumor that required urgent surgery.

One-year survival among patients of group I was not observed. The average life expectancy (ALE) of patients was 8.2+0.3 months. In group II one-year survival rate was 4.5%, i. e. only 1 patient lived for 15.5 months. Overall survival rate was 11.3+0.4 months ($P_{1-2} \leq 0,05$). In group III one-year survival was 78.3%. During 1 year, 3 died of progression of liver metastases.

Three-year survival rate constituted 17.4%. Five-year survival was not observed.

Conclusions: In cases of resectable gastric cancer with isolated liver metastases patients require combined surgical treatment, as only surgery increases one-year survival rate up to78.3% and a three-year survival to 17.4%.

In the absence of the possibility of surgical intervention it is recommended to conduct long term endoaortic chemotherapy, which significantly increases the average life expectancy from 8.2 to 11.3 months.

References:

1. Aksel E. M. Gastric cancer mortality rate among the population of Russia and CIS countries//II periodical National Cancer Institute by Blokhin, Russia – 2011. – T 22. – No 39.
2. Vashakmadze L. A., Butenko A. V., Savinov V. A. Possibilities of multivisceral resection in cases of regional recurrence of gastric cancer//Russian Oncology Magazine. – 1998. – No 4. – P. 53–54.

3. Gromov M. S., Aleksandrov D. A., Kulakov N. A. Diagnostics and treatment of locally advanced gastric cancer//Surgery periodical. – 2003. – № 4. – P. 20–24.
4. Skorohod V.YU., Bordov B. A., Hicheva G. A., Gastric cancer: Comparative analysis of surgical and combined treatment//Problems of Oncology. – 2004. – T. 50. – No 1. – P. 86–90.
5. Podlujniy D. V., Abstract of PhD Theses – 2002.
6. Hornas S. S., and coauthors. Gastric cancer, clinical manifestation, diagnostics and treatment// – Tomsk – 2013.

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Method of surgical treatment of children with unilateral congenital cleft lip and palate

Abstract: The congenital cleft lip and palate (CCLP) is one of the most common malformations of the face and jaws, and it is among the most severe defects in terms of the severity of the anatomical and functional disorders.

Keywords: congenital cleft lip and palate, primary cheilo-palatoplasty

Introduction

Regardless of the age of a child suffering from the congenital cleft lip and palate (CCLP), the main task of the surgeon is to restore anatomic form of the lip and its adequate functioning. Nowadays there are a lot of methods which provide only underwhelming aesthetic and functional results, but still need some improvement [2; 4; 5; 7; 10; 13; 15 and 19].

According to different authors the number of individuals with the postoperative complications and the poor long-term results after cheilo- and palatoplasty ranges from 16 to 52%. In domestic and foreign literature inadequate attention is paid to the primary cheiloplasty with the most optimal methods taking into account the degree and a form of the cleft. A high percentage of unsatisfactory results points to a lot of unresolved issues and the relevancy of this problem. The most debated issue is the determination of the optimal age and methods for surgical treatment of children with the congenital malformations of the face and jaws [3; 6; 9; 16; 19; 20].

The urgency of this problem is determined not only by the high fertility rate of children suffering from this disorder, but also with the difficulties in selection of the surgical treatment [4; 10; 14]. We think that the main cause of unacceptable functional and cosmetic results could be also the imperfection of the traditional treatment methods, unreasonable choice of those methods of surgical correction and the age approaches to its implementation. Also the important cause of failure is the lack of sufficiently clear and complete picture of the problems which are inherent to these patients, and the effects of the implementation of certain surgical procedures in remote postoperative period [1; 12; 18].

The global experience on treating patients with CCLP caused the possibility of good results of surgical correction of the primary defects and secondary deformities [2; 5; 17; 19]. At the same time, the existence of such issues as the optimal age of the child for the primary surgical correction, choice of the optimal functional and less traumatic method, the cumulative effect of these factors on the subsequent state of the sense of hearing, the speech, the growth of the maxilla and the middle zone of the face and the general development of a child, remains controversial and widely discussed in the domestic and foreign literature. However, it is obvious that timely

and correct implementation of the first stage of surgery determines the success of the rehabilitation of patients with the congenital cleft lip and palate [1; 5; 14].

The main and most effective way of the cleft lip's plastic reconstruction is the flap cheiloplasty, which reasonably undergoes changes and improvements over the last few years. The methods of primary cheiloplasty described by Tennison/Obukhova and Millard are in common use in the world's practice [14]. For palatoplasty are used the traditional methods in age from 2.5 to 7 years in order to prevent the damaging effect of the surgery on the growth of the upper jaw. However, in most cases these techniques do not relieve patients from the problems associated with the deformation of the upper jaw, the presence of abnormalities of occlusion and dentition defect, and they do not allow full recovery of speech, and cause trouble the social adaptation of the child [2; 3; 4; 11; 12; 13].

The purpose of the study

Improvement of the efficiency of treatment of the children with the congenital cleft lip and palate, based on anatomically sound approach to surgical treatment and shortening the stages of surgical rehabilitation of the children with the CCLP.

Material and methods

Modern understanding of the development process, the formation and growth of the facial skull and surrounding tissues, knowledge of anatomy and physiology premaxillary-maxillary complex in normal and congenital cleft lip and palate have allowed us to develop and to implement in treatment the functional and gentle method of its correction. The proposed method of the primary cheilo-palatoplasty helps to form a full vestibule of mouth, to close oro-nasal fistula, which allows a normal development of the dent-alveolar arch and facilitates to early orthodontic treatment, reduces stage surgical treatment. As the prototype was taken one-step method of cheilo-palatoplasty by F. Burian (1955).

Figure 1. Cheilo-palatoplasty by F. Burian (1955).

Planning and conduction of the primary cheilo-palatoplasty by the developed method

Operative intervention was performed to all patients under the endotracheal anesthesia. We preferred to use the absorbable sutures «VICRYL 5–0», «POLYSORB 5–0» for suturing the muscles and the oral mucosa, and not absorbable sutures «PROPILEN 6–0» or «SURGILENE 6–0» for the skin. Before performing the incisions on the tissue of the upper lip, the nose and the alveolar bone the 0.5% Novocain solution with the traces of adrenaline was injected, which greatly facilitated dissection of tissue and reduced bleeding during the surgery.

The planning of the surgery was started by finding the points of splitting fragments in the upper lip (A, A1) and the definition of the line incision on the skin by Millard (B, B1). Then, from this point was performed incision in the planned lines on the fragments of the upper lip. The incision was continued until the base of the upper lip frenulum (C) and dissected the frenulum under the 45 ° for 0.5 cm. (C, C1), which lengthened the vestibular space and formed out the defect to the triangular shape (Figure 3). Then the required size of the quadrangular flap was cut out on mucous large fragment (C2), and after its transferring to the defect region (C, C1) it was sutured (Figure 4).

By putting the equal distance on the medial fragment to the corner of the mouth the point of splitting was found out on the lateral fragment of the upper lip, and this length of the lateral fragment is copied to the upper lip (A1). The incision was performed from this point in direction to the mucous of the nose wing by the planned lines. Further from the split point (A1) the incision was carried down under the 90 ° to the arc of Cupid, in direction to the defect and down parallel to the lines of scheduled creases transition without reaching it by 0.2–0.3 cm.

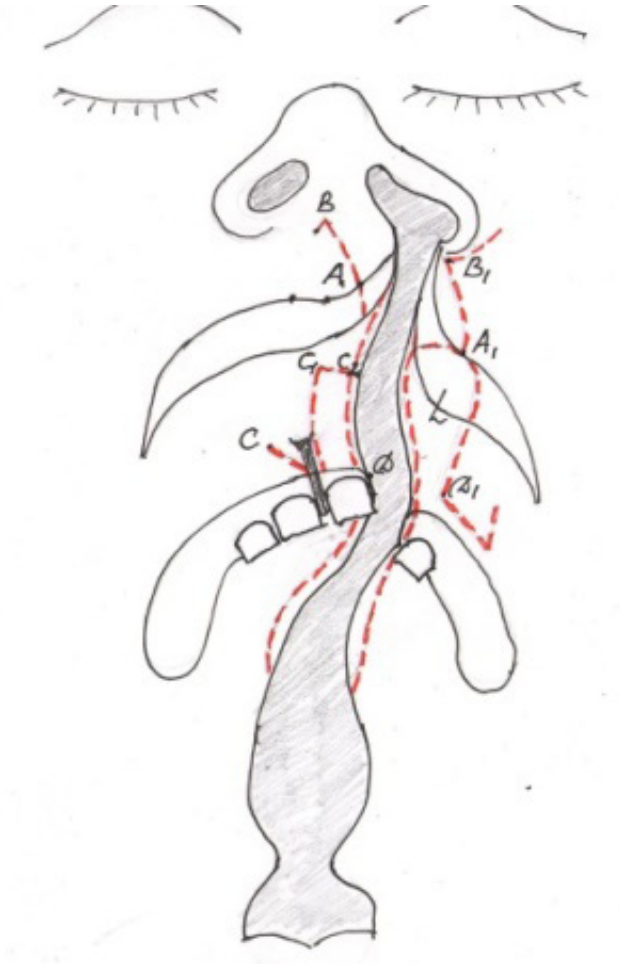

Figure 2. Planning of operation

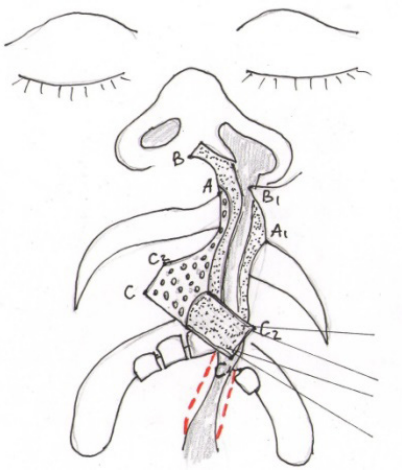

Figure 3.

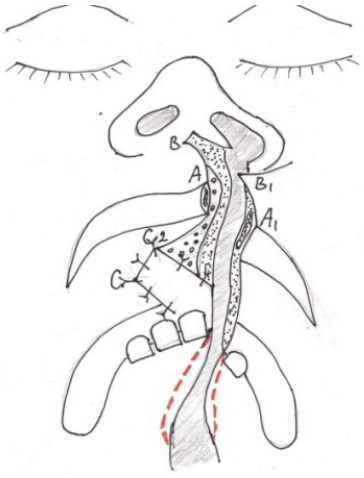

Figure 4.

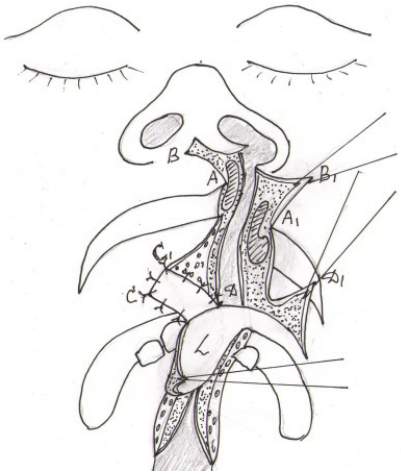

Figure 5.

Thus the mucousal-submucosal L patchwork was formed out (Figure 5). This flap was moved to the medial fragment and the incision "poker" by Limberg A. A. was performed at the transitional fold of the lateral fragment (D1) (Figure 5). It was followed by separation of the orbicular muscle of the mouth. Further incisions were done in some distance from the edge of the cleft for 2–4 mm till the ½ of the hard palate (Figure 5). This incision might be slightly increased or decreased depending on the length of the flap L. Then the nasal mucosa was separated and eversionally sutured (Figure 6).

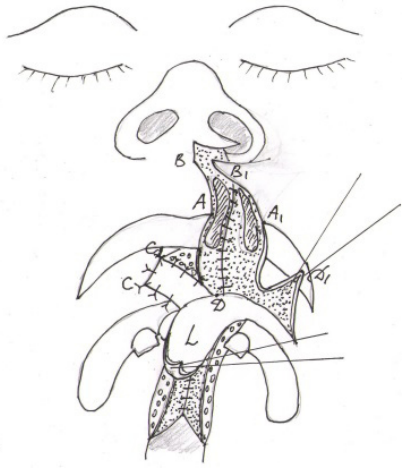

Figure 6.

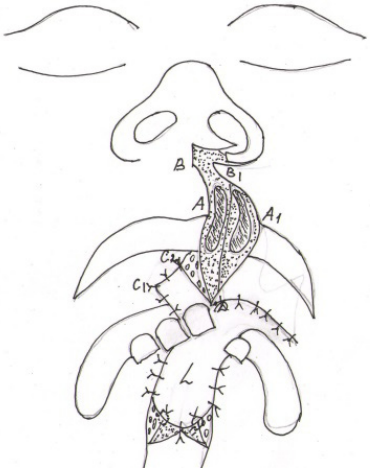

Figure 7.

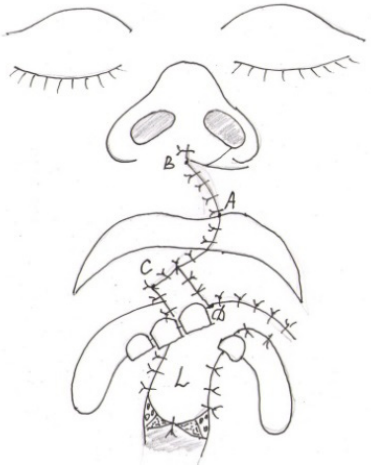

Figure 8.

Then the L flap was moved down to the transitional fold of the large fragment (Figure 6). The mucous mobilized by "poker" incision was moved medially (D1 → D) and was sutured, and thus the vestibule of the mouth was deepened and the oro-nasal fistula was closed. Then the L flap was applied to the wound surface of the palate's mucosa and was sutured to the edges of the wound (Figure 7). Finally, the stitches were put on the mucosa, the muscle and the skin of the upper lip (Figure 8).

12 children with the congenital unilateral cleft lip and palate at the age of 6–10 months got the primary cheilo-palatoplasty by the proposed method at the clinic of children's maxillofacial surgery of the Tashkent State Institute of Stomatology.

By our method of primary cheiloplasty facilitated to simultaneously restore the vestibule of mouth, to close oro-nasal fistula and to correct the cleft in the anterior part of the hard palate. To assess the severity of disease we have used the classification of L. E. Frolova (1974). Analysis of the literature and our clinical experience show that the CCLP almost always is accompanied by a shortening of frenulum. The classification of the Khoroshilkina F. Y. (1982) was used for assessment of the level of shortening of frenulum. Division of the patients according to the gender and the severity of disease is presented in the Table 1.

Table 1.Division of patients according to gender and severity of disease

Degree of shortening frenulum of upper lip / **Degreeof the CCLP**	**I degree**	**II degree**	**III degree**	**Total**
CCLP I degree	–	2	2	4
CCLP II degree	1	3	1	5
CCLP III degree	1	1	1	3
Total	2	6	4	12

For illustration we give an example (Figure 9):

A B

Figure 9. Patient G. 6 month. Diagnosis: Congenital cleft lip and palate. II degree. Cheilopalatoplasty by the proposed method was carried out: A –before surgery, B – after surgery.

Thus, the use of the performed method in congenital unilateral cleft lip and palate allows to simultaneously eliminate the upper lip's cleft and the oro-nasal fistula, to normalize the vestibular space by extending the upper lip frenulum and close the cleft of the anterior part of the hard palate, which consequently reduces the operational and orthodontic intervention stages.

References:

1. Amanullaev R. A. Frequency of fertility children with congenital cleft lip and palate in the major regions of Uzbekistan//congenital and hereditary diseases of the head, face and neck of children. Topical issues of complex treatment: materials of scientific practical conf. – M., – 2006. – P. 14–15.
2. Artyushkevich A. S., Ruman G. M. Early surgical treatment of congenital cleft lip and palate: Educational handbook. – Minsk, – 2002.
3. Bernadsky Y. I. Traumatology and reconstructive surgery cranio-maxillo-facial area. – M., – 1999.
4. Gonchakov G. V. Issue of surgical treatment of children with congenital unilateral cleft lip and palate. – M., – 2002.
5. Kozin I. A. Aesthetic surgery of congenital facial cleft. – M.: Martis, – 1996.
6. Lilja H. Treatment of congenital cleft lip and palate in Gothenburg//congenital and hereditary diseases of the head, face and neck of children. Topical issues of complex treatment: scientific practical conf. materials – M., – 2002. – P. 150–151.
7. Mahkamov E. U. Early treatment of children with congenital cleft lip and palate: Dis., MD – M., – 1981.
8. Pritko A. G. Comprehensive treatment and rehabilitation of children with congenital craniofacial disorders: Dis., MD – M., – 1997.
9. Shcheglova A. P., Zakharov N. I. Malimon T. V. Need for comprehensive treatment of children with congenital cleft lip and palate//Mater. III All-wRussia. scientific practical conf. materials "Congenital and hereditary diseases of the head face and neck of children: current issues of comprehensive treatment." – M.: – 2009. – P. 352–353.
10. Yakovlev S. V., Dyakov S. V., Kondrashov S. P. The frequency of comorbidity of children with isolated cleft lip and palate//prevention and treatment of dental diseases of children: Materials of republican conference of dentists. – Ufa, – 2006. – P.90.
11. Ciancio S. G. Cleft lip and palate gene identified//J. Am. Dent. Assoc. – 2000. – Vol. 131, – No 10. – P. 1414–1418.
12. Jones D. L. The relationship between temporal aspects of oral-nasal balance and classification of velopharyngeal status in speakers with cleft palate//Cleft Palate Craniofac. J. – 2000. – Vol. 37, – No 4. – P. 363–369.
13. Kohout MP, Aljaro LM, Farkas LG, Muliken JB Photogrammetric comparison for synchronous repair of bilateral cleft lip and nasal deformity//Plast. Reconstr. Surg. – 1998. – Vol. 102, – No 5. – P. 1339–1349.
14. Meneghini F. Clinical facial analisis. Elements, principles, techniques. – Springer: Berlin, – 2005. – 182 p.
15. Millard D. R. Jaws//Cleft Craft: The evolution of its surgery. – Vol. 3: Alveolar and palatal deformity. – Boston: Little Brown, – 1980. – P. 895–977.
16. Millard D. R., Morovic C. Primary unilateral cleft nose correction: A 10-year follow-up.//Plast. Reconstr. Surg. – 1998. – Vol. 102, – No 5. – P. 1331–1338.
17. Mueller K., Neuber B., Schelhorn-Neise P., Schumann D. Diagnostic value of nasometry representative study of patients with cleft palate and normal subjects//Folia Phoniatr. Logop. – 2007. – Vol. 59, – N 5. – P. 219–26.
18. Nagahama M., Laguinge R., Sakamoto N. Secondary unilateral cleft lip nasal deformities: Open approach for correction//Transactions of 9th International congress on cleft palate and related craniofacial anomalies. Goteborg, Sweden, – 2001. – P. 91–105.
19. Nolst Trenite G. J. Secondary rhinoplasty in the bilateral cleft//Fac. Plast. Surg. – 2002. – Vol. 18, – No 3. – P. 179–186.
20. Schendel S. A. Unilateral cleft lip repair//Cleft Palate Craniofac. J. – 2000. – 37, – No 4. – P. 335–341.

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Antibiotic resistance of hospital strains of Enterobacteriaceae and phenotypic methods for detecting beta-lactamases

Abstract: Resistance of hospital infections of Enterobacteriaceae to antibiotics is important, which is not enough explored in Uzbekistan. The identification of the cultures and determination of bacterial resistance realized by conventional phenotypical methods. The high resistance of hospital strains of E. coli to cephalosporins 3–4 generations, ertapenem, and aztreonam. Highest sensitivity of E.coli indicators identified in relation to fosfomycin, netilmicin and tigecycline. Enterobacteriaceae resistant to ertapenem in phenotypic confirmatory method ICM found that 21.9% of strains were negative in tests on carbapenemases; from positive to test most frequently (in 68.0%) was the simultaneous production of MBL and KPC. It rarely detected MBL (28%), and only 4% KPC products.

Keywords: Hospital infections, antibiotic resistance, Enterobacteriaceae, beta-lactamases.

To date, ß-lactams are the most widely used antibiotics. Among them, the most popular at the moment are the cephalosporins 2–3rd generations and carbapenems (imipenem, meropenem and ertapenem), forming the basis of modern chemotherapy [4; 13; 15; 16; 17]. Resistance Gram-negative bacteria to β-lactam antibiotics most often associated with the production of ß-lactamases are the greatest source of resistance to them. Among the wide variety of beta-lactamases are of particular importance: 1.ESBL-extended-spectrum ß-lactamase capable of destroying all β-lactam antibiotics except carbapenems and aztreonam. 2.Carbapenemases — enzymes, heterogeneous structure, belonging to different molecular classes, different genetic groups within groups — various genovariants. Among them, an important role is played by KPC- serine carbapenemases Class A; MBL — metallo-β-lactamases, MBL within the group the most frequent genetic groups are VIM, IMP and NDM –1. The genes responsible for the production of beta-lactamases usually located on mobile genetic elements -integrons, plasmids, and others [3; 4; 11; 13]. Detection of resistance genes in the PCR is the most reliable and accurate method, but in the daily work of microbiologist difficult doable. In the literature widely report of phenotypic methods available in the routine laboratory for detecting resistance mechanisms of bacteria to antibiotics and, in particular — the detection of various embodiments β-lactamases [5; 6; 9; 12; 14]. Phenotypic methods are important not only for the rational and competent treatment of patients with infections, they are necessary for early detection of carriers of multiresistant strains, especially in hospitalized persons (individual risk), which may contribute to the early detection of the circulation of resistant strains and timely adoption of measures to control the infection.

Purpose: Identify resistance of hospital strains of Enterobacteriaceae to β-lactam and other antibiotics, determine the frequency of various products beta lactamase by phenotypic methods.

Material and methods. All strains of Enterobacteriaceae isolated from various biomaterials (pus, urine, sputum, etc.). Collection of material were performed by specialists of bacteriological laboratory of General Hospital № 1 of Tashkent and its primary selection made by conventional methods for identification of pathogens using manual Berg's [1]. Them identification and controlled by laboratory TIPME. All of strains resistance detected to 3–4th generation cephalosporin's by conventional disc-diffusion method (DDM), when assessing the limit values of the inhibition zones (LVIZ) using the recommendations of the European Committee for the sensitivity definition to antibiotics EUCAST [8] and created on the basis of this document Clinical guidelines of "Determination of the sensitivity of microorganisms to antimicrobial agents", the RF [3]. Testing was performed on Mueller-Hinton medium with commercial discs of antibiotics. For confirm the production of different variants of carbapenemases used method of combined disk — MCD [2, 5]. The method is as follows: on the disk surface of the medium overlaps with an inoculum culture studied with conventional antibiotic concentration and at a distance from it a combined drive with the same antibiotic and inhibitor. To determine the ESBL used commercial discs with cephalosporin's of the 3-th generation (ceftazidime, ceftriaxone and cefotaxime) + clavulanic acid; to determine the MBL — carbapenems antibiotic (meropenem, imipenem, ertapenem) + ETDA (Ethylenediaminetetraacetic acid); to determine the KPC — the same antibiotics carbapenems + aminophenylboronic acid; to determine the AmpC + loss of porins — the same antibiotics carbapenems + cloxacillin. Differences breakpoints around of antibiotic disc (cephalosporins or carbapenems) and disks with the same antibiotic and an inhibitor of 5 mm or more show production of the enzyme. During the observed period (2015 (0,5year) — 2016) was allocated 144 cultures of E. coli and strain 81, which consists of the combined group genera Klebsiella-Enterobacter. Single of strains of Proteus, Serratia, Citrobakter et al. did not take account of.

Results and discussion. Of the 144 strains of E.coli, 40 (27.8%) were positive in the preliminary screening (resistant to one of antibiotics); in Klebsiella-Enterobacter group such strains were much smaller — only 9 (11.1%) isolate from 81. Of the 49 strains of Enterobacteriaceae only 10.2% were resistant to 3-th generation of cephalosporin's, them according to EUCAST [8] and numerous other sources, presumably can be attributed to the producers of ESBL with no other enzymes that hydrolyze carbapenems. But in parallel with this, almost all Enterobacteriaceae (89.8%) were resistant to ertapenem, which raised doubts to antibiotics disks. When checking the activity of commercial discs of ertapenem with 30 mkg, microorganisms of different taxonomic groups (including the reference strains of S. aureus ATCC 25923, E.coli ATCC 25922, P.aeruginosa ATCC 27853) revealed that the breakpoints of the studied species of microorganisms (for example, S. aureus ATCC 25923–30 mm). His indicates that an almost complete absence of enterobacteria delay zones around the disc ertapenem growth is not related to the quality of the discs themselves.

Subjected to further study the most numerous group of multidrug-resistant strains of E.coli hospital, the collection was supplemented and consisted of 57 strains. The DDM determined antibiotic resistance added cefuroxime, cefepime and aztreonam; also investigated tetracyclines, chloramphenicol, fosfomycin, aminoglycosides and fluoroquinolones. The results showed a very high level of resistant to all hospital Escherichia studied cephalosporins. Share sensitive Escherichia in descending order: ceftriaxone and cefotaxime at 8.8%, 5.3% cefuroxime, cefepime 1.8% and the total lack of sensitivity to ceftazidime (moderately resistant strain of 4–7.0%). Among the most active were the carbapenems imipenem (87.7%) to meropenem sensitive strains accounted for only 54.5%, but there was a high proportion of moderately stable among the rest (16–28%). Preliminary screening results on the resistance E.coli were confirmed to ertapenem — only 5 (8.8%) isolates were susceptible, resistant 91.2%. Unusual was almost complete lack of sensitivity to aztreonam E.coli only 2 of 57 (3.5%), while it is known that the antibiotic monobaktam highly active against to enterobacteria and clinics in conditions recommended as reserve medication. Among non betalaktam the greatest impact on the studied strains had fosfomycin and tigecycline — 91.2% and 86.0% respectively sensitive. Fluoroquinolones are not highly active, there was the highest percentage sensitive to ofloxacin — 24.6%, still less to ciprofloxacin (21.1%) and levofloxacin (17.5%). Of the two studied aminoglycosides (gentamicin and netilmicin) was more active netilmicin — 77,2% E.coli were susceptible to it. Chloramphenicol inhibited growth of 33.3% of the strains. New breakpoints [3], according to which we carried out the study, are often different from those adopted previously [7], and the interpretation of the studied isolates breakpoints must often fall into the category of "stable." Given that our E.coli strains in a high percentage of cases have proven to be "unusual" phenotypes against carbapenems and aztreonam, we checked how the breakpoints expansion affect the strain category (sensitive, moderately resistant and resistant). As shown by these results, if you keep a record on the applicable standards before the number susceptible to meropenem increase to 84.2%, mainly due to the transition moderately resistant to susceptible. To imipenem, ertapenem, and aztreonam categorization changes are insignificant.

Thus, almost 100% of Enterobacteriaceae resistant to ertapenem hospital with sensitivity to imipenem and, to a lesser extent — to meropenem — these are cases that require special attention. According to [1; 8], resistance to meropenem and/or imipenem any Enterobacteriaceae (except Proteae) classifies them as "exceptional" phenotypes, but with the caveat "except for the countries in which carbapenemases-producing Enterobacteriaceae are not uncommon." However, there is the exclusive local resistance phenotypes of Enterobacteriaceae to ertapenem is not clear. A similar question arises with respect to aztreonam, showed an almost complete lack of activity against local strains of Escherichia. Because in our country resistant to ertapenem and aztreonam had not previously been studied, perhaps carbapenemases-producing enterobacteria are not unusual for our region. The high efficiency of ertapenem in infections caused by enterobacteria evidenced publication Kozlov R. S. et al. [10]. The great interest in this issue is due also to the fact that ertapenem is not registered in our country and in clinical practice is not used. The advantages of the product include the ability to single dose, because it is actively bound to plasma proteins, thereby increasing its half-life, and thus can receive a one-time [10]. It is also important that ertapenem is active against ESBL-producing bacteria, which is extremely widespread in many countries of the world. Given the major role of ertapenem as a reserve drug, further work on the phenotypic identification of products carbapenemases we conducted with 32 strains of Enterobacteriaceae resistant to ertapenem –24 strain of E.coli, 5 — Enterobacter cloaceae and 3 — Klebsiella pneumoniae. Each culture is resistant to ertapenem was tested in the MCD with ertapenem and combined drives to determine the MBL, cattle and AMC. As already noted, excess breakpoints diameter 5 mm or more around the disk in combination with a conventional comparison indicates the presence of a particular isolate the enzyme. The results of these studies demonstrated the following: 7 (21.9%) were negative in strains testing carbapenemases MBL, cattle or AMC, as compared with conventional disk drives combined formed around almost the same area of non-growth. 7 strains (25 of a positive testing carbapenemases) — 4 E.coli, Enterobacter cloaceae 2 and 1-Klebsiella pneumoniae, were confirmed phenotypically as producers of MBL (28.0%). These cultures zone around the disk ertapenem ranged from 9 to 12mm, ertapenem + boronic acid 5 from 8 mm to 13 mm, while the area around the combination ertapenem + ETDA was in all cases more than 18–20 mm. 1 (4.0%) strain of Klebsiella were confirmed as producing cattle. 17 (68.0%) strains were phenotypically confirmed as producers simultaneously two carbapenemases — MBL and cattle. This primarily refers to the strains that do not respond to ertapenem (breakpoint- 0), t. E., Even at low LVIZ 13–17 mm around the combined disc, they were regarded as positive for the production of the enzyme. No isolate could not be regarded as a producer of AMC — the area around the drive with ertapenem + cloxacillin for the most part absent or did not exceed 8–10 mm under the same terms in the control disk with ertapenem.

Conclusions. 1. The high resistance of hospital strains of E. coli to cephalosporins 3–4 generations, ertapenem, and aztreonam. Highest sensitivity of E.coli indicators identified in relation to fosfomycin, netilmicin and tigecycline.

2. Enterobacteriaceae resistant to ertapenem in phenotypic confirmatory method ICM found that 21.9% of strains were negative in tests on carbapenemases; from positive to test most frequently (in 68.0%) met the simultaneous production of MBL and cattle producers only rarely detected MBL (28%), and only 4% was set isolated cattle products.

This report is preliminary, it is necessary to further explore other medical institutions of the city, and perhaps some region of the country. DDM must be supplemented by the definition of the minimum inhibitory concentration and, most importantly, spend genotypic study of unusual phenotypes enterobacteria for the presence of genes encoding resistance to carbapenems.

References:

1. Bergey's Manual of Systematic Bacteriology, Second Edition (10), Volume Two, The Proteobacteria, Part B, The Gammaproteobacteria./Don J. Brenner, Noel R. Krieg, James T. Staley EDITORS; George M. Garrity EDITOR-IN-CHIEF. – 2001–2004.
2. Clinical and Laboratory Standarts Institute. 2012. Performance standarts for antimicrobial suscentibility testing: twenty-second informational supplements. M100-S22/CLSI, Wayne, PA.
3. Clinical guidelines "Determining the susceptibility of microorganisms to antimicrobial agents" (Version 2015–02). Sankt-Petersburg, – 10.05.2014, – Moscow, – 05.23.2014.
4. Cuzon G, et al. Worldwide diversity of Klebsiella pneumoniae that produce beta-lactamase blaKPC-2 gene.//Emerg. Infect. Dis. – 2010. – No 16. – P. 1349–1356.
5. Doylea D., Peirano G., Lascols C. et all. Laboratory Detection of Enterobacteriaceae That Produce Carbapenemases. J. Clin. Microbiol. – 2012. – V. 50. – No 12. – P. 3877–3880.
6. Garrec H. at all. Comparison of Nine Phenotypic Methods for Detection of Extended-Spectrum β-Lactamase Production byEnterobacteriaceae.//J. Clin. Microbiol. – 2011. – V. 49. – No 3. – P. 1048–1057.
7. Guidelines 4.2 1890–04 "Determination of the sensitivity of microorganisms to antibiotics." Russian Federation, – Moscow, – 2004.
8. Guide EUCAST by definition and the specific antimicrobial resistance mechanisms that have particular clinical and/or epidemiological value. Revision 1.0, December – 2013.
9. Jacoby G., Walsh K., Walker V. Identification of Extended-Spectrum, AmpC, and Carbapenem- Hydrolyzing ß-Lactamases in Escherichia coli and Klebsiella pneumoniae by Disk Tests.//Journal of Clinical Microbiology. – 2006. – V. 44. – N. 6. – P. 1971–1976.
10. Kozlov R.S, Nikulin A. A. Ertapenem – representative of a new group of carbapenems.//KMAX. – 2009, – T. 11. – No 1. – P. 40–55.
11. Kuznetsova M. V., Plotnikova E. G., Karpunina T. N., Horowitz E. S., Demakov V. A. Molecular genetic studies in laboratory diagnosis and monitoring of pathogens of nosocomial infections (Review)//Perm Medical Journal. – 2010. – T. 27, – No 6. – P. 129–138.
12. Lee K., Lim Y. S., Yong. D. Evaluation of the Hodge Test and the Imipenem-EDTA Double-Disk Synergy Test for Differentiating Metallo-ß-Lactamase-Producing Isolates of Pseudomonas spp. and Acinetobacter spp//Journal of Antimicrobial Chemotherapy. – 2008. – V. 61. – P. 1244–1251.
13. Nordmann P., Naas T., Laurent P. Global Spread of Carbapenemase-producing Enterobacteriaceae.//Emerging Infectious Diseases. – 2011, – Vol. 17. – No 10. – P. 1791–1798.
14. Rastogi V, Nirwan PS, Jain S, et al. Nosocomial outbreak of septicaemia in neonatal intensive care unit due to extended spectrum β-lactamase producing Klebsiella pneumoniae showing multiple mechanisms of drug resistance.//Indian J Med Microbiol. – 2010. – No 28. – P. 380–384.
15. Sukhorukova M. V. Et al, the research group «Marathon» – Antibiotic resistance nosocomial Enterobacteriaceae strains in hospitals of Russia: results of a multicenter epidemiological study MARATHON in – 2011–2012//KMAX. – 2014. – T.16. – No 4. – P. 254–266.
16. Tzouvelekisa L. S., Markogiannakisb A., Psichogiouc M., Tassiosa P. T. and Daikosc G. L. Carbapenemases in Klebsiella pneumoniae and Other Enterobacteriaceae: an Evolving Crisis of Global Dimensions.//Clin. Microbiol. Rev. – 2012. – V. 25. – No 4. – P. 682–707.
17. Walsh T. Emerging carbapenemases: a global perspective. International.//J. of antimicrobial agents. – 2010. – No 3683. – P. 8–14.

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The experience treatment by the external fixation device of our design

Abstract: The apparatus for osteosynthesis of long bone fractures has several advantages comparing to the traditional treatment methods. The rod device is easy to use and comfortable for patients. We evaluated the efficiency of the rod device in patients with fractures of the long bones.

For the period from 2011 to 2015 25 patients with fractures of the femur and tibia with multiple and associated injuries were treated using the rod device of our design. The average age of patients was 43.4 years (range 19 to 68).

The results of the study investigated in all patients from 12 months to 26 months. The average period of fixation by the device depended on the appearance of signs of consolidation and the nature of fractures. The average term for type A was 12–14 weeks, for type B and C — 14–16 months (according to AO classification). Complete fusion was observed in 22 patients.

One patient had a bilateral fracture of the shin bone, which was not observed seam leg bones, this time treated. The second patient had improper splice of shin bone as a result of early device removal. Inflammation of soft tissue around the bone rod was observed in 3 (12%) cases, which managed by subcutaneous antibiotic injections around bone rods and frequent dressings.

The designed transosseus apparatus for osteosynthesis of long bone fractures on the basis of modern locks may be the method of choice.

The use of the rod system for patients with multiple and associated injuries can achieve general stabilization and early mobilization of patients and the development of movement in the adjacent joints.

Keywords: polytrauma, fractures, external rod.

Background

Multiple injury is a serious injury and it still remains as one of the main causes of death, in spite of advanced study of the problem. Mortality is observed up to 40%, disability reaches 28–50% that is mainly because of musculoskeletal system damage [1; 2; 3].

Stabilization of injured extremities plays an important role in multiple and associated injuries in order to save the patients lives, as well as to prevent possible complications, such as fat embolism and thrombosis, hypostatic pneumonia — especially in the elderly. All the measures should be less traumatic and with minimal stress for the patient. Fixation should be performed in a short period of time with minimal blood loss and minimal damage of main vessels. There should not be post fractural hematomas and patients have to be activated as early as it possible.

The external fixation device matches all the requirements above and allows to perform osteosynthesis of the fractures in several segments [5; 6; 7].

The purpose of our research was to investigate the efficiency of the external fixation device of our design in cases of lower extremities fractures.

Materials and Methods

The rod device has been developed (patent N **FAP 00737** 0019 from 08.06.12) in order to perform long tubular bones. The device has four arc blocks connected in pairs by threaded drawbars installed in the arms of the cantilever bar (1). The device has a central arc-shaped block with to longitudinal apertures (5, 6). The two threaded bars which connect the blocks are fixated along two sides of the apertures. The arms that have cantilever bars are fixated by drawbars (2). The block with apertures is longer than other blocks.

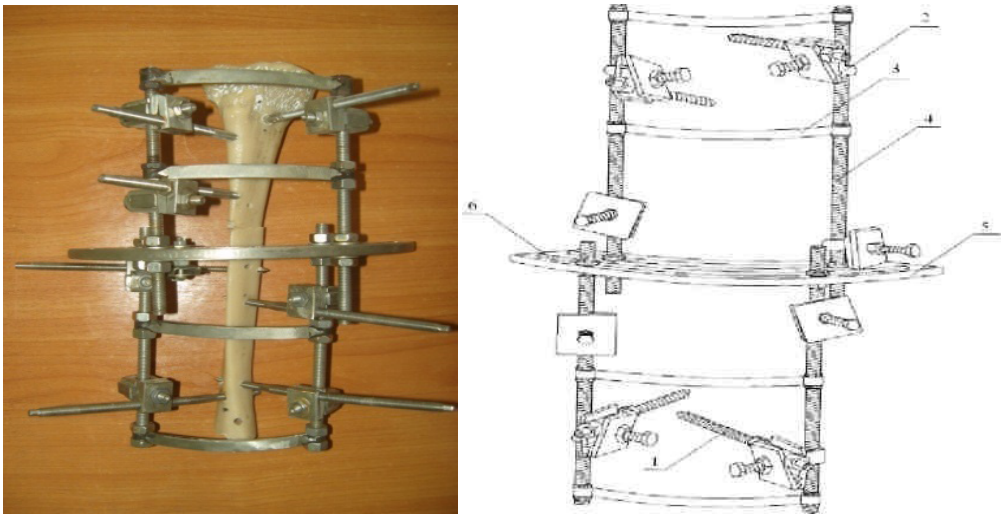

Figure 1.

For the period from 2011 to 2015 there were treated 25 patients with the fractures of the thigh and shin bones with multiple injuries using the rod device of our design. 6 of them were women (24%) and 19 were men (76%). The average age of patients was 43,4 (from 19 to 68). According to the AO classification the character of the fractures were: A1–4; A2–7; A3–2; B1–6; B2–4; C1–2;

Open fractures were in 5 (20%) and closed fractures were in 20 (80%) cases. By the mechanism of the trauma there were: road accidents 16 (64%), house injuries–7 (28%) and street injuries–2 (8%). All patients had a concomitant and multiple trauma: in 12 of them had been diagnosed with a closed head injury. 1 patient had intracranial injury and brain contusion. 2 patients had compression fracture of the body of lumbar and thoracic vertebrae, 2 patients had that of the pelvic bone. Two patients had broken ribs associated with hemathorax. 2 patients had combined fracture of the femur and tibia. 1 patient had bilateral fracture of the shin bone. 15 patients were delivered with traumatic shock. The first degree was observed in 8 patients, the second degree of shock was observed 4 patients and 3 patients were diagnosed with the 3rd degree of shock.

Clinical and radiographic studies were carried out during the admission. Osteosynthesis was performed in the period from the first 6 hours to 10 days after injury. Intubation and spinal anesthesia is performed for the operative intervention. For the patients who had open fractures there were conducted initial surgical d-bridement of wounds and osteosynthesis using rod device. For the patients with concomitant damage of the abdomen or limb vessels there was performed an operation by urgent indications in two teams — laparotomy with suturing parenchymal organs rupture and stabilization of long bone fractures by rod apparatus. Thoracentesis for diagnostic and therapeutic purposes was performed in 4 cases, when patients were suffered by the rupture of the lungs on the background of multiple fractures of ribs. Subdural hematoma was detected in one case.

The post-operative period was uneventful and patients received antibiotics according to the standard procedures. On the 2–3rd days after the application of the external fixation device, patients began to perform the movements of the hip, knee and ankle joints. The average length of inpatient treatment was 10.6 days. On 2–3rd days, patients began active movement of adjacent joints and walked with crutches with metered load. The pain in the affected limb was clinically evaluated in patients, as well as the condition of the soft tissue around the rods.

Results and discussion

The final results were studied for all the patients. Hypostatic pneumonia was observed in 4 (16%) cases. Bedsores of sacral region were occurred in 3 cases (12%). Inflammation of the soft tissue around the bone was observed in 3 (12%) cases. All the complications were managed by sanation dressings and antibiotic therapy.

Long-term results of treatment studies have examined in all the cases from 12 months to 26 months. The control examination

was performed in every 8–10 weeks after discharge. Consolidation of fractures was evaluated by clinical and radiographic studies. The average period of fixation by external fixation device depended on the appearance of the signs of consolidation and the nature of the fracture. The average term for type A was 12–14 weeks, for type B and C — 14–16 months *(according to AO classification)*. Complete fusion was observed in 22 patients.

2 patients had improper splice of the shin bones as a result of early device removal. Treatment outcomes were assessed by the system of E. R. Mattisa [15]. The study of long-term outcomes of the treated patients showed that in all cases positive results were good in 22 (88%), and found to be satisfactory in 2 cases (8%). An unsatisfactory result was recorded on 1 case (4%).

There is a clinical example for illustration.

Patient M., 56 years old, was injured in a traffic accident. A concomitant injury and closed craniocerebral injury were diagnosed. Closed comminuted fracture of the middle third of the right shin bones with displacement of the fragments (according to the classification AO/ASIF — 42-B2.3 Figure 2). Transosseous osteosynthesis of the right shin bone by the rod device of our design was performed after 12 hours from the time of injury (Fig. 3). The residual displacement of the fragments detected on the X-ray, first rotary mixing was eliminated, then the width offset was eliminated by compression of the fragments. On the third day after the injury the patient was prescribed a course of rehabilitation. The postoperative period was uneventful, which allowed to discharge the patient on the 7th day from the hospital with a satisfactory range of motion in the joints of the damaged leg, the apparatus was removed after 14 weeks, (Fig. 4). There is a complete consolidation of the tibia and fibula at the control examination after 1 year on the control radiograph (Fig. 5). The patient had no complains while walking, motion in the knee and the ankle joints are complete, there is a good anatomical and functional results.

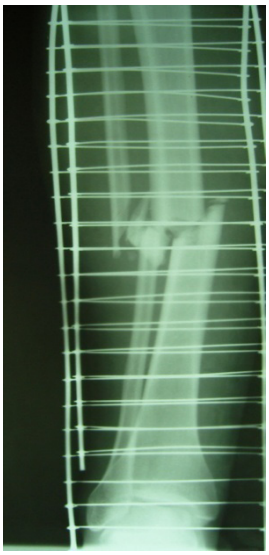

Figure 2. X ray of the patient before

Fig. 3 X ray: after the operation

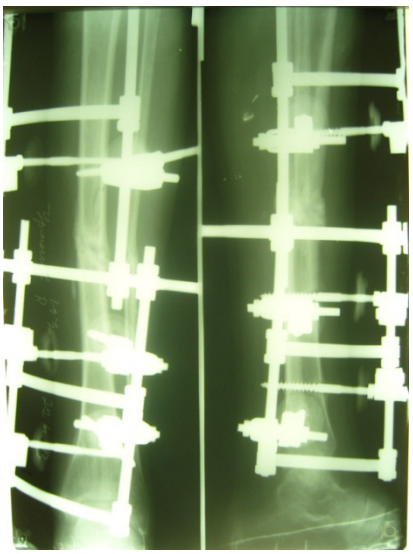

Figure. 4. X-ray of the patients after 14 weeks.

Fig. 5. X ray of the patient after a year

Discussion

The large arsenal of methods of treatment of long bone fractures with multiple and associated injuries does not satisfy the orthopedic surgeons and it makes them turn to look for the new methods of treatment [8; 9; 10; 11; 12]. Stabilization of fractures in case of multiple injury promotes early activation and prevention of secondary complications and it is of a great importance for patients. The developed device retains the qualities of the other devices of external fixation: simple for application, a short time of surgical intervention, a small amount of blood loss, less invasiveness, does not damage the feeder vessels, gives a stable fixation of bone fragments and holds the bone fragments from one side [13, 14]. In addition to the above features, the device allows to kep metal-bone distance throughout the limb due to its step-shape, which enhances stability and saves it

until the fusion of the bone fragments. Also, it reduces the load on the fracture site when the patient walks.

Conducting the early osteosynthesis of long bones by the external fixation device in case of multiple and associated injuries has allowed the general stabilization of the patients and the early development of movements in adjacent joints. Also it prevents the appearance of hematoma at the fracture site and promoted the fusion of bone fragments. Rigid stabilization of bone fragments eliminated the pain in the affected limbs, which contributed the early activation of patients and prevention of secondary complications and restore the anatomy of the affected limb.

Conclusion

The designed apparatus of transosseus osteosynthesis of long bone fractures based on rod mechanism of the known modern locks may be the method of choice in case of multiple injuries.

The use of the rod system for the patients with multiple and associated injuries allows to achieve the general stabilization of patients and early development of the movements in adjacent joints. The rod device helps to manage the displacement of bone fragments and provides a rigid fixation in the period of fusion, maintaining the joint function and it may widely used in traumatology and orthopedics.

References:

1. Политравма/В. В. Агаджанян, А. А. Пронских, И. М. Устьянцева [и др.]. – Новосибирск: Наука, – 2003. – 492 с.
2. Политравма. Септические осложнения/В. В. Агаджанян, И. М. Устьянцева, А. А. Пронских [и др.]. – Новосибирск: Наука, – 2005. – 391 с.
3. Организационные проблемы оказания помощи пострадавшим с политравмами. Агаджанян В. В.//Политравма. – 2012, – No 1. – С. 5–8.
4. Femoral shaft fracture fixation and chest injury after polytrauma. By Lawrence B. Bone, MD, and Peter Giannoudis, MD, FRCS//The journal of bone & joint surgery volume 93-a d number 3 d february 2, – 2011. – 311–317.
5. Остеосинтез стержневыми и спице-стержне-выми аппаратами внешней фиксации/О. В. Бейдик, Г. П. Котельников, Н. В. Островский. – Самара: ГП «Перспектива», – 2002. – 208 с.
6. Maurizio Catagni, Medhat Sdeek, Francesco Guerreschi et all. Management of proximal femoral fractures using the Ilizarov principles//Acta Orthop. Belg., – 2012, – 78, 588–591.
7. Leiv m. Hove, MD, PhD, Yngvar Krukhaug, MD, PHD, Kåre Revheim, MD et all. Dynamic compared with static external fixation of unstable fractures of the di stal part of the radius//The journal of bone & joint surgery d jbj s.org volume 92-a d number 8 d July – 21, – 2010. – P. 1687–1696.
8. Роль чрескостного остеосинтеза по Илизарову в системе реабилитации травматологических больных с множественными переломами костей/С. И. Швед [и др.]//Гений ортопедии. – 2000. – No 2. – С. 5–9.
9. External fixation: how to make it work/B. H. Ziran, W. R. Smith, J. O. Anglen, P. Tornetaill//The journal of bone & Joint surgery (Am). – 2007. – Vol. 89, – No 7. – P. 1620–1632.
10. Tetrafocal bone transport of the tibia with circular external fixation: a case report/F. Guerreschi, W. Azzam, M. Camagni [et al.]//The journal of bone & Joint surgery (Am). – 2010. – Vol. 92, – N 1. – P. 190–195.
11. Sheena R. Black, MD, Michael S. Kwon, MD, Alexander M. et all. Lengthening in congenital femoral deficiency.//The Journal of bone & Joint surgery – Volume 97-a d Number; – 17 d ; September 2, – 2015. – 1432–40.
12. Theddy Slongo, M.D, Timo Schmid M.D., KayeWilkins, DVM, MD, and Alexander Joeris, MD. Lateral external fixation for di splaced unreducible supracondylar humeral fractures in children. The journal of bone & Joint surgery volume 90-a d number 8 d august – 2008. – 1690–1697.
13. Green S.A. The Ilizarov method. In: Browner B.D., Jupiter J.B., Levine A.M., Trafton P.G.(eds). Skeletal Trauma: Fractures, Dislocations, Ligamentous Injuries. – Vol. 1. Philadelphia, etc: WB Saunders, – 1997. – P. 661–701.
14. Huston JJ .Jr., Zych G.A. Treatment of comminuted intraarticular distal femur fractures with limited internal and external tensioned wire fixation. J. Orthop Trauma – 2000. – 14: 405–413.
15. Маттис Э. Р. Экспертиза исходов внутри- и околосуставных переломов и их последствий/Э. Р. Маттис//Внутри- и околосуставные повреждения опорно-двигательного аппарата: сб. науч. трудов. – Л., – 1983. – С. 94–97.

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The combined use of acetylcysteine and 3% of sodium chloride in the nebulizer therapy of acute bronchiolitis

Abstract: Aim: to assess the effectiveness of the combined use of 10% acetylcysteine and 3% of sodium chloride in the nebulizer therapy of acute bronchiolitis in infants. 82 patients with acute bronchiolitis have been examined. In the I control group there were 21 patients who received traditional therapy, patients of the II–IV groups have received nebulizer therapy with

different medications: in the II group 21 patients received 10% acetylcysteine, in the III group 20 patients received 3% sodium chloride, in the IV group 20 patients received 10% acetylcysteine and 3% sodium chloride. In the IV group of patients we examined a reliable improvement of cough, sputum, indexes of saturation — scale assessment (SSA), duration of hospitalization and oxygenation not only in the comparison with the control group, but also in the comparison with II–IV groups (P<0,05; P<0,01; P<0,001). Combined nebulizer therapy with use of 10% solution of acetylcysteine and 3% solution of sodium chloride can be recommended for the treatment of children with acute bronchiolitis.

Keywords: acetylcysteine, 3% sodium chloride, children, combined therapy, nebulizer therapy, acute bronchiolitis.

Introduction. It is known that in the genesis of bronchial obstruction in children is based on different pathogenetic mechanisms (bronchospasm, inflammatory infiltration, mucociliary insufficiency, hypersecretion of viscous mucus), leading to changes in the quantity and rheological properties of sputum, disorders of drainage function of bronchi — mucostasis [1, 7].

The main therapeutic measures at the syndrome of acute bronchial obstruction in children aimed at the reduction or relief of infectious-inflammatory edema, bronchospasm, and ensure adequate oxygenation of the blood [3].

A number of studies show ineffectiveness sympathomimetic medications in young children with broncho-obstructive syndrome due to the weak development of the bronchial muscles, as well as due to the bronchial obstruction with swelling of the mucous membrane and thick difficult separated mucous secret in this age [11].

Nebulized inhalation of hypertonic sodium chloride solutions in the complex treatment of bronchiolitis in children, allowing to reduce the time of the disease have been offered in the present time [9]. Application acetylcysteine in the broncho-obstructive syndrome in children leads to depolarization mucoproteins, helps to decrease mucus viscosity and facilitates removal from the bronchial tract [2; 4; 6].

In recent years, perspective trend in therapy is the combined use of not only multi-directional drugs, but also drugs of complementary action [8].

There are studies of nebulized inhalation bronhiolitics (ventolin, epinephrine), together with hypertonic solutions of sodium chloride in the treatment of bronchiolitis, leading to a decrease in the duration of hospital treatment for bronchiolitis in children of the first six months of life [10]. It is noted that the combined drugs affecting on the several mechanisms of mucostasis is insufficient.

In this case, it is considered necessary to study the effectiveness of the combined use of acetylcysteine and hypertonic sodium chloride solution in the nebulizer treatment of acute bronchiolitis in infants.

The aim was to evaluate the efficacy of combined use 10% of acetylcysteine and 3% of sodium chloride in the inhalation treatment of acute bronchiolitis in infants.

Materials and methods of investigation. We observed young children (from 6 months to 3 years old) with acute bronchiolitis who were hospitalized in the pediatric emergency departments and pediatric intensive care units of SBRSCEMC. Admission criteria were as follows: age before 3 months, assessment due to RDAI scale ≥ 6 points, assessment due to SSA scale ≥ 7 points, a high risk of the disease complications, the absence of home treatment effect for ≥ 48 hours, unfavorable premorbid background and the presence of comorbidities. The carried out investigation was corresponded to prospective randomized controlled design.

Exclusion criteria of patients from the observation groups were as follows: chronic (hereditary) diseases of respiratory system and congenital heart malformations.

In the course of our scientific research it was examined 85 infants with acute bronchiolitis who corresponded to the inclusion criteria, 3 patients were excluded: in 1 child was diagnosed chronic obstructive bronchitis, in 2 patients were diagnosed congenital heart malformations. As a result, 82 patients were enrolled in the study.

All patients by the use of randomized method were divided into 4 groups. 21 patients who received traditional therapies with oral ambroxol have included in I group (control group). Patients of II–IV groups were also received traditional treatment in combination with a particular medication. In the II group it has been included 21 patients treated with inhalation of 10% acetylcysteine solution through compression nebulizer. 20 patients treated with inhalation of 3% sodium chloride solution through compression nebulizer have in the III group. In the IV group it has been included 20 patients treated with a 10% solution of acetylcysteine and 3% sodium chloride solution through compression nebulizer. Acetylcysteine dosage was 15 mg/kg, the drug is diluted in 5 mL of 0.9% sodium chloride solution. Dosage of sodium chloride was 0.5 ml/kg of body weight. Inhalation therapy was conducted 3 times a day at intervals of 8 hours for 4–5 days.

The severity of the cough reflex was assessed by the point system: 0 points — no cough, 1 point — a single cough, 2 points –moderately expressed cough and 3 points — frequent, painful cough and sputum discharge severity was assessed on a scale of 0 points — the sputum is absent, 1 point — discharge easily, 2 points –heavily discharge and 3 points — does not discharge.

Assessment of the effectiveness of the performed therapy along with clinical and laboratory — instrumental methods of investigation have been carried out by the use of SSA — saturation–scale assessment which was developed by us and calculated with using the following formula: SSA = $(95\text{-}SpO_2)$ + RDAI [5].

As additional criteria for the effectiveness of the treatment, the duration of oxygen therapy and the duration of hospitalizations have been studied. The general condition of the patient was assessed both due to studied parameters, and due to the results of the general daily examinations before and in 60 minutes after the nebulizer therapy.

The results of investigation. On admission, the boys were — 44 (53.7%), girls — 38 (46.3%), the average age was 9,0±1,1 months, patients hospitalized in the department on the 2,4±0,3 day of the disease.

The dynamics of the cough reflex intensity (Figure 1) shows that in patients of all examined groups, there was improvement of symptoms (in points) in the background of the performed therapy. So, on the 1–3 days it has been occurred the enhancement of cough reflex associated with clinical features of the disease and on the 4th day the improvement of such symptom was observed. Thus, the comparative effectiveness of nebulizer application both in isolation of 10% solution of acetylcysteine and 3% sodium chloride solution (II and III group) and their combination use (IV group) as compared with oral administration of ambroxol was significantly observed an average on 3 (2 2±0,2 in the control group, 1.6±0,2 in group IV; P<0.05), 5 (1,7±0,1 in the control group, 1,1±0,1 in group II, 1,2±0,1 in group III, 0,9±0,1 in group IV; P<0.01, P<0,05, P<0,001), and 8 (1,4±0,2 in the control group, 0,8±0,1 in group II, 0,9±0,1 in group III, 0,6±0,1 in group IV; P<0.01, P<0,05, P<0.001) days of observation.

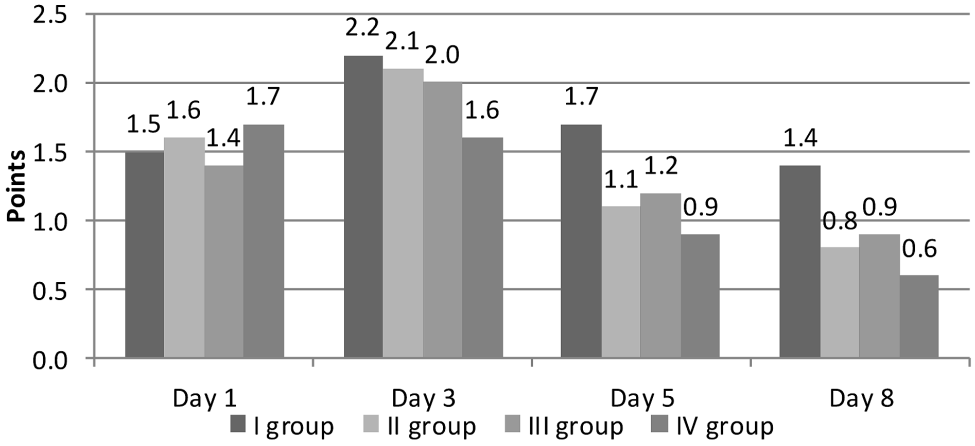

Figure 1. Dynamic of cough reflex in patients of I — IV groups

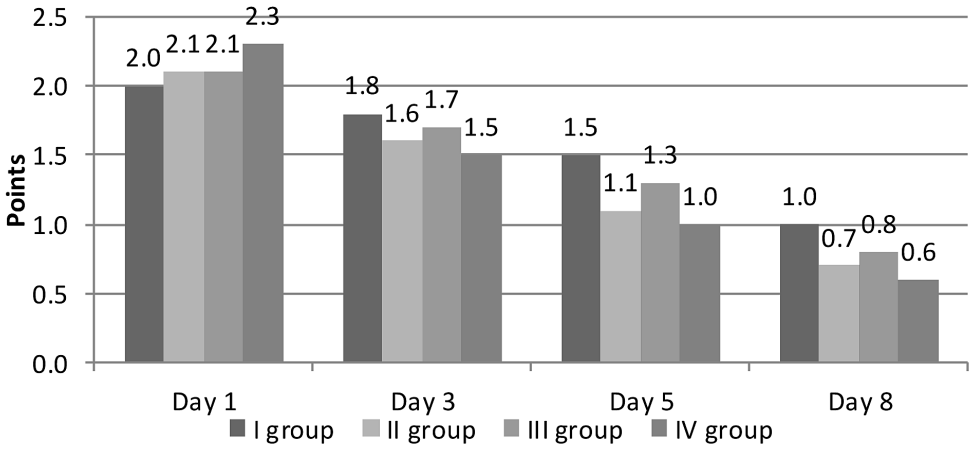

Figure 2. Dynamic of sputum discharge in patients of I — IV groups

It was found that during admission to hospital the sputum was heavily discharged with varying severity of coughing, but starting from 3 days of mucolytic therapy in most patients «productive» cough with sputum discharge was examined. It has been determined a significant advantage of nebulizer therapy in the II–IV groups over the control group with oral use of ambroxol, which was demonstrated on average in 5–8 days of follow-up (P<0.05, P<0,01, P<0,001).

Table 1. – The dynamic of indexes of saturation — scale assessment of the observed groups

Groups	Day 1	Day 2	Day 3	Day 4	Day 6	Day 8
I group (control)	13,0±1,0	10,2±0,8	8,9±0,6	6,8±0,5	4,6±0,3	1,9±0,1
II group	13,2±1,1	9,8±0,7	7,5±0,4*	5,5±0,4*	1,8±0,1***	0,6±0,1***
III group	12,7±0,9	8,3±0,5*	6,3±0,4**	5,1±0,4**	3,4±0,3**	0,9±0,1***
IV group	13,1±0,8	7,8±0,5** ^	5,3±0,3*** ^, #	3,8±0,3***, ^, #	1,1±0,1***, ^, #	0,4±0,1***, #

*Note: * – P<0,05, ** – P<0,01, *** – P<0,001 – reliability of differences in the comparison with II–IV and control groups, ^ – reliability of differences between II and IV groups, # – reliability of differences between III and IV groups.*

The study of the dynamics SSA indexes (table 1) shows that in patients of II–IV groups who received nebulizer therapy by 10% solution of acetylcysteine and 3% solution sodium chloride have been observed more significant clinical-laboratory effect, compared with patients of the control group. There was a significant difference in improving the clinical symptoms of bronchial obstruction between the patients of II–III groups and IV group, which was observed on average from 2–3 days of therapy, reaching its peak at 5–6 days. The combined use of 10% acetylcysteine and 3% of sodium chloride reduces mucosal edema; improve drainage properties and decrease formation of mucus in the bronchus of medium and small caliber, at the same time eliminating the most important links in the pathogenesis of bronchial obstruction.

Table 2. – Duration of hospitalization and performed oxygen therapy in patients of I–IV groups

Criterion	I group	II group	III group	IV group
Duration of hospitalization (days)	7,0±0,4	5,8±0,3*	6,0±0,3*	4,9±0,3***, ^, #
Duration of oxygen therapy (days)	4,7±0,3	3,8±0,3*	3,4±0,3**	3,1±0,2***, ^

*Note: * – P<0,05, ** – P<0,01, *** – P<0,001 – reliability of differences in the comparison with II–IV and control groups, ^ – reliability of differences between II and IV groups, # – reliability of differences between III and IV groups.*

Combined use 10% solution of acetylcysteine and 3% solution of sodium chloride as an nebulizer inhalation resulted in a significant decrease in duration of oxygen therapy, shortening of hospital treatment of patients on average for 2.1 bed-days in patients of IV group compared with the control group, and for 0,9 and 1,1 bed-days compared with II and III groups respectively (table 2).

Nebulizer therapy 10% solution of acetylcysteine and 3% sodium of chloride solution in this study was not associated with significant adverse side effects, which corresponded to a sufficient level of the drug safety.

Conclusion. Thus, the combined use of a nebulizer inhalations of 10% solution of acetylcysteine and 3% solution of sodium chloride in comparison with the isolated use of medications is an effective method of complex treatment of acute bronchiolitis in infants, promotes the improvement of patency and decreases edema of airways, the intensity and duration of cough, decrease sputum viscosity, reduce the duration of oxygen therapy and periods of hospital treatment.

References:

1. Bronchitis and bronchiolitis. Acute obstructive conditions of respiratory tracts. Scientific-information material. – Moscow, – 2011. – P. 198.
2. Ivashev M. N.., Sergienko A. V. Clinical pharmacology of acetylcysteine.//Successes of the modern natural science. – 5. – 2013. – P. 116–117.
3. Stenins O. I., Paunova S. S., Chakvetadze S. S., Donin I. M. Inhalation therapy of broncho-obstructive syndrome in infants with acute respiratory diseases.//Pediatric Journal. – 2010; 89:10. – P. 62–65.
4. Ushkalova E. A. Acetylcysteine in the clinical practice: the present time and perspectives.//Pharmateca. – 2007. – № 17. – P. 30–36.
5. Shavazi N. M., Lim M. V., Zakirova B. I., Lim V. I., Tursunkulova D. A. The assessment of the degree of broncho-obstruction in acute bronchiolitis in infants.//Materials of III conference of the Association of Doctors of Emegency Medical Care of Uzbekistan. Tashkent, October – 29–30, – 2015. – P. 285.
6. Shavazi N. M., Lim M. V. The effectiveness of nebulizer inhalations of acetylcysteine in the therapy of acute bronchiolitis in infants.//Problems of Biology and Medicine. – 2016. – No 2 (87). – P. 116–119.
7. Shamsiev F. M., Mirsalikhova N.Kh. et al. Pathogenetic approach to the therapy of cough in children with inflammatory diseases of respiratory system.//Health of Uzbekistan. – No 4 (06) – 2016. – P. 42–47.
8. Shmeleva N. M. The use of mucoregulator ascoryl in the diseases of respiratory organs.//Therapeutic archive. – No 10. – 2012. – P. 86–90.
9. Gupta H. V., Gupta V. V., Kaur G. et al. Effectiveness of 3% hypertonic saline nebulization in acute bronchiolitisamong Indian children: A quasi-experimental study. Perspect Clin Res. – 2016. – Apr-Jun; – 7 (2):88–93.
10. Khalid Al-Ansari, Sakran M., Davidson B. L. et al. Nebulized 5% or 3% Hypertonic or 0,9% Saline for Treating Acute Bronchiolitis in infants.//The Journal of Pediatrics. – 2010. – Vol. 157. – No 4. – P. 630–634.
11. Zorc J. J. Inhaled epinephrine does not shorten hospital stay for infants with bronchiolitis destined to develop repeated bronchospasm. Lancet Respir Med. – 2015. – Sep; 3 (9):665–7.

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New technologies in the treatment of congenital chest deformities of in children

Abstract: Malformation of the thorax in children are serious diseases that pose serious difficulties for the correction. This paper presents the authors developed methods of surgical treatment of children with different variants of the funnel and keeled

chest deformation. The comparative aspect with traditional methods thoracoplasty analyzed the results of treatment and complications in the intraoperative, the near and distant postoperative periods.

Keywords: congenital deformities of the chest, thoracoplasty children.

Congenital chest wall deformity (CCWD) is observed among children and adults, and estimated to have prevalence from 0.4 to 2.3% of the cases [1; 2; 3; 4; 5; 7]. Among EQAP more than 90% is funnel chest deformity (FCD) and about 8% is keeled deformation of chest wall (KDCW) [6; 9], the remaining 2% falls on Poland's syndrome, splitting and splitting the sternum, Kurrarino-Silverman syndrome [2; 4; 5]. The vast majority of surgeons are of the opinion that the treatment of chest deformities only operative [6; 10]. To date, there is no consensus on the indications for treatment and the choice of method of surgical correction.

Most of the proposed surgical correction methods have a common drawback — a large traumatic, with a relatively high risk of intra- and postoperative complications. Currently minimally invasive, less traumatic at the same time more efficient surgical interventions aimed at full correction of chest deformities with the maximum cosmetic effect are preferred by many. A wide range of interventions and the lack of a common approach in the selection of readings and the correction method in the treatment of EQAP demonstrate the relevance and complexity of the problem requires finding new ways of solving the problem of correction of chest deformations, taking into account the patient's aesthetic requirements, indicating the need for our research.

Aim of work. To improve the results of treatment in children with FCD and KDCW and through the development and application of minimally invasive methods of surgical correction.

Materials and methods. In Andijan regional children's diversified medical centers, at the Department of Pediatric Surgery in the period from 2012 to 2016 the author's procedures operated on 55 children and adolescents with EQAP. These children are the main group (MG).

Among patients with a congenital deformity of the chest 34 (75.6%) were children under 6 years with funnel chest deformity (FCD) and cor-costal form keeled chest deformation (KDCW) — 21 (24.4%). Of the 21 children with KDCW 18 were aged 8–15 years and older — 3 patients. KDCW met in 18 (85.7%) boys and 3 (14.3%) girls. 20 (58.8%) patients had FCD 2nd degree of deformation, and 14 (41.2%) — third degree. Symmetrical shape deformation were 22 (64.7%) patients, asymmetric — 12 (35.3%).

Performance indicators copyright transactions were compared with two comparison groups (CG). Clinical comparison group (CCG) 1 amounted to 28 previously operated on children with FCD Ravich traditional method over the period 2004 to 2006. The CCG 2 included 16 children with KDCW, also operated in the center of traditional methods thoracoplasty from 2006 to 2010. A total of CCG1 and CCG 2 it operated on 44 children with FCD and KDCW. The degree of deformation in the chest FCD evaluated by calculating the index J. Gizicka (1962) [8] on the profile X-ray is the ratio of the smallest distance to the largest sternovertebralnogo space. And when KDCW severity of the front chest wall deformation objectivized Lois by calculating the angle (the angle formed by the handle and the body of the sternum) on chest radiograph in lateral projection. All patients were from the II and III degree and FCD KDCW thoracoplasty performed by the author's methods. Follow-up care and scheduled scan after treatment were carried out in 3 months. 6 months., And then at 1 and 3 years. The statistical accuracy of the estimation of observed variables clinical effect expressed by confidence intervals (95%). Statistical data processing was carried out on a PC using the «SPSS Pro» software package. The critical level of significance when testing statistical hypothesis was $p = 0.05$.

A method of treating funnel chest. The author's method of surgical treatment of funnel chest is as follows: on the chest wall of the cross-section of the skin is no longer than 4 cm in the joint area of the xiphoid process to the body of the sternum; skin mobilization, the subcutaneous tissue, ligaments and retrosternal dissection with removal of the xiphoid process; under the control of the finger in the retrosternal area determined resistance and rigidity sterno-costal complex (SCC); with sufficient ductility and resistance to Marshing bus traction SCC installed traction sutures to the sternum body with subsequent fixation to Marching bus; with the presence of resistance and greater rigidity SCC additionally perform vertical sternotomy followed by fixation to SCC Marching bus; mobilize rectus muscles followed them to the most in-depth section of the body of the sternum, which provides additional traction SCC in the act of inspiration, as in the age category of children type of breathing is mainly abdominal. The claimed method allows to reduce the duration of the operation, greatly reducing the amount of intraoperative blood loss during surgery, reducing trauma of surgery that helps out the use of analgesia and early mobilization of patients, respectively. On the way to obtain a certificate of the right to intellectual property of the Republic of Uzbekistan. "Minimally invasive techniques thoracoplasty when funnel chest in children" DGU 03579 of 08/02/2016.

A method of treating keeled chest deformity. The author's method of surgical treatment keeled chest deformation as follows: Performing on the chest wall of the vertical incision no longer than 8 cm; skin mobilization, the subcutaneous tissue and pectoral muscles one flap to provide minimally invasive access for thoracoplasty and thereby improves the aesthetic appearance of the patient, as well as significantly reduce blood loss during surgery and the likelihood of hematoma in the postoperative period; complete resection of the deformed costal cartilages (II–VIII ribs) on both sides and linking them end-to-end single interrupted sutures; transverse sternotomy at the top of the highest bending, shortening retrosternal ligament and suturing it to the lower third of the posterior surface of the sternum 3–5 cm above together with the rectus abdominis; layering stitching wounds with imposing cosmetic skin suture. The claimed method thoracoplasty simple to perform, available, not traumatic, but also makes it possible to shorten the duration of postoperative hospital stay. On the way to obtain a certificate of the right to intellectual property of the Republic of Uzbekistan: "Method thoracoplasty keeled chest deformation." DGU 03580 of 03/03/2016.

Results and discussion. Evaluation of long-term results in the exhaust gas was carried out according to the criteria: good, satisfactory, unsatisfactory. Based on these characteristics, the results of treatment recognized as good in 31 (93.1%) and 19 (90?5%) patients with FCD and KDCW main group versus 21 (58.8%) and 12 (80,0%) reference group of children, satisfactory in 2 (4, 54%) and 1 (4,8%) to 3 (14,7%) and 2 (12,5%) have unsatisfactory 1 (2,26%) and 1 (4,8%) to 4 (26.4%) and 1 (6,25%) patients, respectively (Fig. 1.).

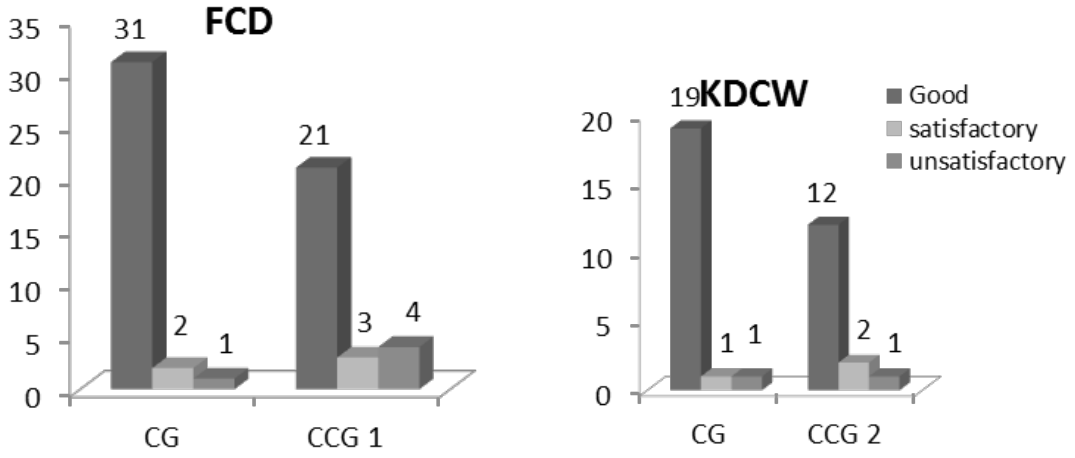

Figure 1. Comparative evaluation of the surgical treatment of FCD and KDCW depending on the author and the traditional type of thoracoplasty

We have also analyzed the complications of surgical interventions, which are conditionally divided into intraoperative, postoperative nearest and late after thoracoplasty, which are presented in table 1 and 2.

Table 1. – Feature intraoperative, the near and long-term complications of our and traditional options when thoracoplasty in FCD

№	Complications	CCS 1 (n=28)		CS (n=34)		Up	pφ
		абс	%	абс.	%		
Intraoperative complications							
1	damage to the pleura, pneumothorax	2	7,1	–	2,9	2,21	<0,013
2	Intraoperative bleeding	3	10,7	1	5,9	2,66	<0,004
3	duration operation for more than 3 hours.	21	75,0	1	5,9	7,61	<0,001
Nearest postoperative complications							
1	Hemodynamic disorders	7	25,0	1	2,9	3,54	<0,001
2	Festering wounds, secondary healing	6	21,4	–	–	3,86	<0,001
Long-term postoperative results							
1	Relapse strain	4	14,3	1	2,9	2,91	<0,001
2	overcorrection GRK	3	10,7	–	–	2,68	<0,003
3	keloid scar	4	14,3	2	5,9	1,25	н. д.

Comparative analysis of complications thoracoplasty traditional version with the author's technique when FCD shown (Table 1) that intraoperative complications such as damage to the pleura and pneumothorax occurred was 7,1% (pφ <0,013) cases and intraoperative bleeding was in 10,7% (pφ < 0.04) and prolonged surgery observed (more than 3 hours.) in 75,0% (pφ <0,001) cases. In the immediate postoperative period were observed complications, such as hemodynamic disorders in 25,0% (pφ <0,001), secondary healing in 21,4% (pφ <0,001) cases and recurrence of deformation at 14,3% (pφ <0,001), overcorrection sterno-costal complex at 10,7% (pφ <0,003) and keloid scarring wound surface at 14,3% (pφ> 0,05) of sick children in the late postoperative period. The above-mentioned complications were observed much less frequently in the treatment and administered by our technique. They were observed in the form of pneumothorax in 2,63% (pφ <0,013), intraoperative bleeding in 5,26% (pφ <0,004), long-term operation in 5,26% (pφ <0,001), hemodynamic disturbances at 2.63% (pφ <0,001), recurrent strains in 2,63% (pφ <0,001) and the formation of keloids at 5,26% (pφ> 0,05) cases, respectively.

Table 2. – Feature intraoperative, the near and long-term complications of our and traditional options when thoracoplasty in KDCW

№	Complications	CCS 2 (n=28)		CS (n=34)		Up	pφ
		абс	%	абс.	%		
Intraoperative complications							
1	damage to the pleura, pneumothorax	3	18,7	1	4,8	2,18	<0,011
2	Intraoperative bleeding	5	31,2	–	–	1,46	<0,002
3	duration operation for more than 3 hours.	13	81,2	2	9,5	6,51	<0,001
Nearest postoperative complications							
1	Hemodynamic disorders	4	25,0	1	4,8	2,45	н. д.
2	Festering wounds, secondary healing	3	18,7	–	–	2,72	<0,008
Long-term postoperative results							
1	Relapse strain	3	18,7	1	4,8	2,64	<0,001
3	Keloid scar	2	12,5	1	4,8	1,13	н. д.

Analysis showed CCS2 complications (Table 2), which damage the pleura intraoperative period, there was a 18,7% (pφ> 0,011) cases intraoperative bleeding 200 ml 31,2% (pφ <0,002), long duration of operation (more 2 hrs.) to 81,2% (pφ <0,001). Hemodynamic disturbances in the early postoperative period with low reliability observed in 25,0% (p> 0,05). If in the early postoperative period secondary infection and wound healing, as well as the discrepancy seams meet in 18,7% (pφ <0,008) cases, the complications in the form of full deformation and recurrence of keloid scarring surgical wound late after operation was observed at 18 7% of the cases and 12.5% respectively. In the present embodiment, the above-mentioned author thoracoplasty complications were observed much less frequently. That is, damage to the pleura to 2.18%, a long surgery in 6.51% of cases in the intraoperative period, hemodynamic disturbances in 4.8% of cases in the immediate postoperative period. In the late postoperative period for clinical and X-ray parameters observed in 1 child full relapse strain (4.8%). The emergence of the strain of recurrence appear to be associated with a wrong, abnormal growth of costal cartilage of the zone associated with the presence of the patient's connective tissue dysplasia. KDCW In addition, he noted scoliosis, joint hypermobility, arachnodactyly that, in the our opinion contributed deformation relapse one year after thoracoplasty. Based on the above scientific statements can draw the following general conclusions: When conducting operations in the traditional version FCD to the application of our option transactions intra- and postoperative complications were observed in 29.5% of operated children, and (pφ <0,001) after the application of our proposed operations optimized version thoracoplasty rate decreased to 3.95%, that is. e., in more than 7 times. Our proposed option thoracoplasty children with KDCW allowed to reduce complication rates in the intra- and postoperative periods in 9.2 times, ie, from 23.2% to 2.52%.

Thus, we have developed thoracoplasty ways when FCD and KDCW are minimally invasive and very effective methods of treatment, can reduce the trauma of surgery, reduce the operation and, thus, anesthetic time, accelerate the activation time of patients and reduce the duration of pain, minimize operational and postoperative complications, improve cosmetic results.

References:

1. Абдрахманов А. Ж., Анашев Т. С., Тажин К. Б. Диагностика и хирургическое лечение воронкообразной и килевидной деформации грудной клетки//Травматология және ортопедия. – Астана, – 2005. – No 2. – С. 24–25.
2. Виноградов А. В. Деформации грудной клетки у детей (Хирургическое лечение и медико-социальная реабилитация): Автореф. дис. … докт. мед. наук. – М, – 2004. – 22 с.
3. Жила Н. Г. Хирургическая моделирующая коррекция врожденных и приобретенных деформаций грудной клетки у детей и подростков: Автореф. дис. … д-ра мед. наук. – Иркутск – 2000. – 16 с.
4. Малахов О. А., Рудаков С. С., Лихотай К. А. Хирургическая коррекция воронкообразной и килевидной деформаций грудной клетки у детей и подростков//Актуальные вопросы детской травматологии и ортопедии: Сб. тез. конф. детских травматологов-ортопедов России. – М., – 2001. – С. 260–261.
5. Разумовский А. Ю., Романов А. В., Рудаков С. С., Гаджимирзаев Г. Г. Торакопластика при врожденных пороках грудной клетки у детей//Актуальные вопросы детской травматологии и ортопедии: Сб. тез. конф. детских травматологов-ортопедов России. – М., – 2001. – С. 278–279.
6. Goretsky M. J., Kelly R. E., Croitoru D., Nuss D. Chest wall anomalies: pectus excavatum and pectus carinatum//Adolesc. Med. – 2004. – Vol. l5. – P. 455–171.
7. Gizicka J. Ocena wakazan i metod leczenia operacynjnegolejkowatej bleatki piersiowej u dzici oraz analiza uzyskanych wynikow//Klin. Khirurgii dziecieceg A. M. w. Warszawie, kierownik Panst. zakiwydwo lekarskich. – 1962. – Vol. 9. – P. 80–87.
8. Kuhn M. A. Pectus Deformities/M. A. Kuhn, D. Nuss//Fund of Pediatric Surgery. – 2011. – Part 6. – P. 313–321.
9. Fonkalsrud E. W. Management of pectus chest deformities in female patients.//J.Am Surg. – 2004. – Vol. 187. – P. 192–197.

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Modern approach to the problem of acne

Abstract: Acne actual problem of the modern youth. Treatment of acne topical problem in dermatology. Due to the frequent recurrences of acne, the problem attacts scientists dermatologist to improve treatments by examining this issue in a more in — depth manner. This article provides an overview of the world literature on the study of acne on the basis of factors of complications.

Keywords: Acne, etiology, pathogenesis, treatment.

Acne — polymorphic multifactorial disease of the hair follicles and sebaceous glands, resulting from excess production of sebum, abnormal follicular hyperkeratosis, inflammatory and immune response in the dermis, the imbalance of lipids, certain sex steroid hormones and genetic predisposition [6; 17].

Etiology of acne poorly understood. It is believed that the following factors play a role in the development of resistantacne: endocrinopathies, metabolic disorders, the imbalance of cellular

and humoral immunity, pathology of the gastrointestinal tract, the hepatobiliary system, central and autonomic nervous system, lowering the barrier-protective function of the skin [3; 5; 8].

Factors of development of acne:

– Genetic predisposition – the number, the size of the sebaceous glands and their sensitivity to the level of androgens (male sex hormones);

– Increased secretion of androgens during puberty, which promotes overproduction of sebum;

– Activation activity saprophytic flora sebaceous hair follicles (propionibacterium acne);

– The development of the inflammatory reaction in the hair follicle in the background hydrolysis of sebum and multiplication of bacteria in it Propionibacterium acnes;

– Follicular hyperkeratosis (excessive development of epithelial cells in the hair follicle, leading to blockage of the sebaceous gland duct epithelial cells horny scales);

– Hormonal changes, increased levels of male sex hormones (androgens), which cause an increase in sebum secretion and increase of both men and women;

– Hormonal changes in the body of women during the premenstrual period (sometimes — during pregnancy);

– Mechanical factors: the habit of propping up chin in his hand, to hold his chin up the phone, wearing tight hats and shirts with tightly buttoned collar, which leads to excessive sweating;

– Squeezing ulcers rough or «black spots» (exacerbates acne, the formation of acne, cysts, which result in scars of the skin surface);

– Work in conditions of high humidity and temperature (in the kitchen or in the room with steam), which stimulates sweating (there is a complete blockage and inflammation of the sebaceous glands);

– The use of halogen-containing products or means (iodine, fluorine, bromine);

– Application of cosmetics with a high content of lanolin, paraffin, mineral oils (fatty creams, moisturizing lotions, sun creams, etc.);

– Receiving a number of drugs, particularly high contraceptive progestins, steroids, drugs lithium, anticonvulsants;

– food. Some foods, for example.chocolate, carbonated beverages, nuts, coffee [11; 13; 16].

Pathogenesis of acne. According to modern ideas, in the pathogenesis of acne played a leading role hyper secretion of sebum and formation of abnormal follicular hyperkeratosis, excess skin colonization P.acneus and the development of inflammation. Also, when colonization P.acneus initiates the migration of lymphocytes, complement activation, and followed with chemotaxis of neutrophils and macrophages in the area of sebaceous hair follicle and the synthesis of antibodies to P.acneus, causing damage to the sebaceous hair follicle development of the inflammatory response that manifests clinically formation of papules, pustules and nodes.

Against the background of excessive production of sebaceous secretion with a reduced concentration of linoleic acid develops pathological actinic akroinfundibulyume fillagrinin creased accumulation in the cells of the granular layer, which leads to obstruction of sebaceous hair follicle (SHF), the accumulation of secretions and the development of hyperplasia. Blockage ductless SHF creates favorable conditions for the reproduction of anaerobic P.acneus in akroinfundibulyume secreting lipases that break down sebum triglycerides into fatty acids, followed by destruction SHF wall [5; 8; 11].

The clinical picture of acne. Varieties of acne:

– Comedones (comedosou acne comedonica);

– acnepapulosa et papulopustulosa;

– acneindurativa;

– acnephlegmonosa;

– acneconglobata;

– acnefulminans;

– acneinversa or hidradenitis suppurativa.

Blockage sebaceous gland filled with sebum, called comedones. They are non-inflammatory nodules solid consistency to 2 mm in diameter. The gradual increase in the volume of the nodules by the constant production of sebum creates the conditions for the conversion of some of them in the "open" blackheads Papular and papulopustulosa acne are the result of inflammation of different severity around the open or closed comedones. In mild form of the disease papulopustulosa acne resolve without scarring. In a significant expression of the inflammatory response, accompanied by damage to the structure of the dermis, the formation of scars in place of inflammatory elements. Most patients belong to the categories exactly acne comedonica and acne papulopustulosa. All other types are relatively rare, but no less important — or because of the severity, or because they require a different approach to therapy [14; 15].

Treatment. The problem of treatment of acne remains relevant despite the numerous studies and the large number of products for external, and for internal administration. However, there is a preparation for a complete solution to this problem. Available modern tools have a number of drawbacks, not completely solve the problem of acne and do not lead to a stabil remission.

Treatment algorithm for acne depends on the severity. Mild includes only topical treatment of moderate and severe includes not only local, but also systemic therapy. Treatment is necessary at the stage of formation of comedones — black dots in multiple advanced estuaries sebaceous gland or white millet subcutaneous nodules [1; 7].

Local treatment is aimed at reducing disorders of keratinization, and the elimination of follicular hyperkeratosis: leading to lysis of the comedones means (retinaldehyde, glycolic acid, azelaic acid), for regulating keratinization means (Cosmetics), peels (ultrasonic, glycol, microdermabrasion), laser treatments (diode laser, wavelength 808 nm)

Mild disease (comedones, several small inflamed pimples) enough local treatment and mechanical removal of comedones in the beauty parlor. In moderate to severe (comedones, pustules in large numbers with severe inflammation) local treatment combined with the general, who is appointed by dermatologist after inspection by specialists: a gynecologist, endocrinologist, gastroenterologist (antibiotics, correction of hormonal disorders, etc.).

Systemic therapy is used for moderate and severe degrees of severity, and combined with an external treatment. Includes of 3 basic areas:

1. Antibiotics.

2. birth control (oral contraceptives).

3. Retinoids [7; 10; 12].

When systemic antibiotic treatment in addition to the direct action of a bacteriostatic drugs have non-specific anti-inflammatory effect. For systemic therapy of acne most commonly used drugs are tetracycline and macrolides. Antibiotics are used for a long time (up to 6 weeks).

The criteria for selection of antibiotic therapy are: the suppression of the activity of Propionbakterium acnes, effect on other Gram (+) and Gram (-) flora, selective accumulation in the sebaceous glands, high bioavailability and good tolerability.

Combination oral contraceptives are effective even at normal androgen levels in blood. Most shows OCs with "epidermotrophic" action. Assign OC from the 1st day of the menstrual cycle for 21 days with a 7-day break for at least 6 cycles reception. The visible effect is observed with the 3rd month of OC. Estrogen-progestin drugs are prescribed after systemic antibiotic therapy.

Retinoids -izotretinoin — appointed in severe forms of acne, propensity to scarring and inefficiency of traditional treatment methods. He is stable remission even in severe forms of the acne and has expressed sebosupressive, leading to lysis of the comedones, anti-inflammatory and immunomodulatory effects. Consequently, retinoids act on all the main links in the pathogenesis of acne. The duration of treatment with retinoids is 16–20 weeks. Side effects of retinoids — dose-dependent.

Thus, the appointment of an adequate effective therapy due to its influence on the pathogenetic mechanisms of the disease. An important prognostic are diagnosis, proper clinical evaluation, the timely appointment of adequate and safe treatments.

References:

1. Albanova VI Acne: a problem of medical treatment//Med. Newspaper – 2004. – No 85. – S. 8–9.
2. Akhtyamov S. N., Safarov GG Acne vulgaris: Questions of etiology and pathogenesis//Ros. Zh. Skin and Venereal Diseases. – 1998. – No 5. – S. 54–58.
3. Gusakov N. Modern acne problems//Sat: Topical issues of plastic, aesthetic surgery and dermatology. – M. – 2001. – SA-78–80.
4. Young's N.A., Logatchev M.F. Acne: the nature of the origin and development issues of systematization and modern landmarks in the choice of therapy//Dermatology. – 2006. – 4: 8.
5. Kubanova A.A., Samsonov V.A., Zabnenkova O.V. Modern features of the pathogenesis and treatment of acne.//West. Dermatology and venerologii. – 2003. – No 1. – S. 9–15.
6. Protsenko T.V. Acne (lecture for doctors). – K., – 2001. – 15 p.
7. Safarova G. Complex treatment of acne vulgaris in view of the pathogenetic mechanisms of resistance to antibacterial therapy and its influence on the process sebaceous excretions: Avtoref.dis … kand.med.nauk. – M. – 1998.
8. Beylot C. Mechanisms and causes of acne//Rev Prat. – 2002. – Vol. 52. – P. 828–830.
9. Black P. A. Acne vulgaris//Prof. Nur-se. – 1995. – Vol. 11. – P. 181–183.
10. Cunliffe W. J. Acne vulgaris//Treatment of skin Disease/Ed/M. Lebwohlet all. – London, – 2002. – P. 6–13.
11. Kenshi Yamasaki, Gallo Richard L.//Eur. J. Dermatol. – 2008. – Vol. 18. – P. 11–21.
12. Halder A., Shaw J. C. Treatment of acne vulgaris//JAMA. – 2004. – 11:726–735. 13. Zaba R. Patogenesis and treatment of acne vulgaris//Dermatol. Allergol. – 2001. – 18. 131–140.
13. Zaenglein A., Thiboutot D. Acne vulgaris//Dermatology. – 2nd ed. – Mosby. – 2008. – P. 495–508.
14. Show J. C., White L. E. Persistent acne in adult women//Arch. Dermatol. – 2001. – 137 (9): 1252–1253.
15. Goodman G. Acne. Natural history, facts and myths. Aust Fam Physican. – 2006. – 35:9:613–616.
16. Webster G. F.//Br. J. Dermatol. – 2002. – Vol. 32. – P. 475–479.

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Influence of radiofrequency ablation on quality of life of patients with ventricular arrhythmia

Abstract: This article provides information about dynamics of quality-of-life indicators relating to 53 patients with ventricular arrhythmia after catheter ablation. It was demonstrated that before surgery all patients had low indicators of life quality and mental health. Following the radiofrequency ablation, it was observed that quality-of-life indicators improved, reaching the reliable values by the 6th month of observation.

Keywords: ventricular arrhythmia, radiofrequency ablation, quality of life, mental health.

Non-ischemic (non-coronarogenic) ventricular arrhythmias (VA) amount to 10–30% of all heart rhythm disorders (HRD) and predominantly occur in people of working age [1; 2]. In 25–80% of patients these rhythm disorders provoke syncope, what significantly deteriorates prognosis and increases the risk of a sudden arithmetic death in this category of patients [3; 4]. The effectiveness of drug therapy of non-ischemic ventricular arrhythmias does not exceed 50–60% [5]. It is known that a continued intake generates a drug

tolerance in 50–70% of patients [6]. 5–30% of patients have various adverse effects as a result of drug intake; its arrhythmogenic effect can be realized in 15% of cases [7]. Finally, 30% of patients are totally resistant to any anti-arrhythmic therapy (Fabricio K., 2001). The abovementioned factors determine the relevance of an operative treatment — radiofrequency catheter ablation of the arrhythmia substrate. Along with various methods for assessment of antiarrhythmic activity, nowadays there is a method that evaluates quality of life (QOL) of patients.

The aim of this study was to evaluate QOL of patients with non-coronarogenic ventricular arrhythmias (VA) before and after radiofrequency ablation.

Material and methods:

We observed 53 patients. All patients were divided into two groups: main group and clinical comparison group. The main group consisted of 33 patients with non-ischemic ventricular arrhythmias (main group). The average age — 35,4± 13,0 years, of men – 19 (%), of women – 14 (33,8%), arrhythmic anamnesis – 4,98± 3,5 years. The clinical comparison group included 20 "practically healthy" persons at the age of 34.6±7.0 years, who according to the research results had no structural pathology of the cardiovascular system. Among them there were 15 men (75,0%) and 5 women (25,0%). Groups of examined persons were comparable by age and sex.

Ventricular extrasystoles (VE) of the II gradation according to Lown (70,5%) prevailed in the structure of ventricular arrhythmias. Gradations IIIA and IIIB were 19% and 17.6%, respectively. The average number of ventricular extrasystoles per day was 17506+13200, the maximum number – 48702. Polymorphism of ventricular ectopia (the number of morphological classes - more than 2) was observed in more than a third of patients, while one leading or dominant focus was always discovered.

Arrhythmogenic zones, according to endocardial electrophysiological study (endo–EFI), were detected in 36 cases (52.9 %) in the region of right ventricular outflow tract, in 8 cases (11,8%) – in the region of right ventricular inlet tract, in 9 cases (13,2%) – in the region of the right and left sinuses of Valsalva, in 4 cases (5.9 per cent) – in the region of the tricuspid valve, in 2 cases (2,9%) – paraxial localization. Much less arrhythmogenic zones were detected in the region of the pulmonary valve (in 2 cases – 2.9%), in mitral valve (in 2 cases – 2.9%); in 1 case (1,5%) – in the region of right ventricular apex. Fascicular left ventricular tachycardia was verified in 3 patients (4,4%), tachycardia with bundle branch reentry – in 1 case (1,5%).

During a clinical examination all patients with non–ischemic ventricular arrhythmias underwent the test with exercise load (bicycle ergometry), body surface mapping and coronary–graphic testing. The following examinations were conducted initially and at the lapse of 2 and 6 months after radiofrequency ablation of arrhythmogenic focus: Holter monitoring of ECG in 12 deflections; quality–of–life examination with use of a common survey SF–36 and a specific survey "Life of patient with arrhythmia"; examination of central hemodynamics by method of transthoracic echocardiography (ECHOCG);

The endo-EFI protocol was performed following the standard method and included determination of an anatomic localization of the arrhythmogenic focus, inducibility of tachycardia and establishment of the way of its reduction. The activation- and stimulation mapping were carried out in order to determine the point of application of the radiofrequency-exposure.

Results and discussion:

The quality-of-life examination revealed that in patients with non-ischemic ventricular arrhythmias before RFA significantly low parameters of QOL were detected on such scales as "physical activity" (PA) and "role of physical problems in vital activity restriction" (RP). The values of such scales as "pain", "general health", "vitality", "social activity", "role of emotional problems in vital activity restriction" in this category of patients were also lower than in the control group, but did not have significant differences.

Table 1. – The quality-of-life parameters of patients with non-ischemic ventricular arrhythmias and patients of the clinical comparison group

Criteria for quality of life	Patients with non-ischemic ventricular arrhythmias before RFA (n=33)	Clinical comparison group (n=20)	p
Physical activity	70,58±25,34*	90,01±14,78*	<0,05
Role of physical problems in vital activity restriction	45,21±35,26*	72,0±20,1*	<0,05
Pain	59,32±24,56	70,32±15,8	>0,05
General health	58,6±23,1	69,32±13,2	>0,05
Vitality	48,65±19,8	61,3±15,4	>0,05
Social activity	59,36 ±28,69	74,21±10,08	>0,05
Role of emotional problems in vital activity restriction	59,2±36,55	67,54±20,21	>0,05
Mental health	59,02±23,21	62,5±10,32	>0,05

Two months after the surgery we observed a significant increase in the scale "physical activity" and reliable improvement of the parameter "role of physical problems in vital activity restriction". In a third of patients the highly intensive physical and occupational loads still caused difficulties.

Six months after the surgery the daily and professional activities of patients were less constrained by health problems and doctors' prescriptions than in the previous period, as evidenced by further growth in such scales as "physical activity" and "role of physical problems in vital activity restriction". Indicators of both scales, which characterize physical health, 6 months after RFA became comparable with similar parameters of the clinical comparison group, what illustrates a complete physical health restoration and absence of restrictions in fulfillment of highly intensive daily and professional loads.

The obtained results of the survey "Life of patient with arrhythmia" in patients with non-ischemic ventricular arrhythmias before a surgical treatment permitted to claim that the main causes of decrease in quality of life were as follows:

1) bouts of palpitation and heart activity interruptions, feeling of cardiac failure — in 25 patients (75%);

2) emergence of depression, worry and anxiety for health and life, mood lowering — in 21 patients (65%);

3) need for self-restriction in use of alcohol, coffee, strong tea, smoking, and difficulties in realization of usual rest, housework, sport activities and hobbies — in 18 patients (55%);

4) dizziness, difficulty in breathing, general weakness, fatigue, cardialgia — in 14 patients (43%).

The average QOL before a surgical treatment of patients with non-ischemic ventricular arrhythmia amounted to 14.02±0.95 points, what corresponds to a high quality of life. Two months after the surgery we revealed a significant decrease in the number of factors, which contribute to decrease in quality of life. The total quality-of-life indicator in patients with non-ischemic ventricular arrhythmia was 6.1±2.58 points ($p<0.05$). The main factors of quality-of-life improvement were upturn of mood, disappearance of anxiety and depressive symptoms, lack of dietary restrictions. The considerable dynamics of quality of life after 6 months (3,98±2.56 points) was not observed in comparison with an average quality-of-life indicator after 2 months.

Conclusion: Thus, analysis of dynamics of quality-of-life parameters confirms that already 2 months after RFA there is a growth of indicators of both physical and psycho-emotional health. A complete physical health restoration is observed after 6 months.

References:

1. 2015 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death The Task Force for the Management of Patients with Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death of the European Society of Cardiology (ESC) The disclosure forms of all experts involved in the development of these guidelines are available on the ESC website URL: http://www.escardio.org/guidelines.
2. Курбанов Р. Д. Желудочковые нарушения ритма сердца. – Ташкент – 2012.
3. United Nations Economic Commission for Europe. UNECE statistical database. Available at URL: http://w3.unece.org/pxweb
4. Jouven X., Desnos M., Guerot C., Ducimetiere P. Predicting sudden death in the population: the Paris Prospective Study I. Circulation – 1999; – 99: – 1978–1983.
5. Жаринов О.И, Куц В. О. Диагностика и лечение экстрасистолической аритмии//Медицина світу. – 2007. – № 5. – С. 312–323.
6. Кабаев У. Т. Непосредственные результаты катетерного лечения желудочковых-фасцикулярных тахикардий: научное издание/У. Т. Кабаев, Т. К. Есенов//Кардиология Узбекистана. – Ташкент, – 2010. – N 2–3. – С. 339 (Шифр К 9/2010/2–3).
7. Соколов С. Аллапинин и современные подходы к лечению нарушений ритма сердца: научное из-дание/С. Соколов//Врач. – М., – 2012. – № 4. – С. 55–59.

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Assessment of the relationship of Gln 551Arg polymorphism of α-chain receptor of gene interleukin-4 (IL4RA) with atopic dermatitis in Uzbekistan

Abstract: The article presents the data of molecular-genetic study of polymorphism Gln551Arg IL4RA gene in patients with atopic dermatitis. As a result of the PCR analysis is installed genetic significant association of this marker with the development of atopic dermatitis.

Keywords: atopic dermatitis, atopy, IL4RA gene, the SNP, polymorphisms Gln551Arg.

Introduction.

Recent years there is the role of cytokine in atopic dermatitis (AD) clinical implications nascency exhaustively covered. Various researchers have made investigations on polymorphism association of allelic variant of a cytokine gene with atopic dermatitis. There have been positive associations [1, 6, 7], as well as absence of positive associations [4, 5] revealed. Cytokine gene receptors play an important role in the development of atopic diseases clinical progression. In this regard, it is reasonable to analyze the allelic polymorphism of cytokines genes and their receptors directly involved in the progression of atopic dermatitis. α-chain of receptor of cytokine interleukin-4-gene (IL4RA) plays an important role in the progression of atopic diseases. Various polymorphisms in the gene IL4RA have been described. In particular: –33C> TIL4 and 576Q> R of IL4RA gene were firmly associated with atopy and bronchial asthma [2; 3].

The aim of research: To optimize oligoprimers system operation for testing IL4RA gene's Gln551Arg polymorphism and study contribution (affect) of this marker to AD progression.

Materials and methods. Materials for our research were the DNA samples isolated (taken) from the peripheral blood of patients with AD and apparently healthy donors — individuals without any signs of atopic diseases. Total studied Gln551 and Arg551 alleles were 150 (100 chromosomes of patients and 50 chromosomes of healthy individuals). DNA purification was carried out by standard methods with some modifications. Amplification of polymorphic (multi-form) loci was performed using polymerase chain reaction on a programmable thermal cycler of «Applied Biosysteems» company (USA). The specificity of the synthesized fragment and the quantity of amplifier was checked by electrophoresis' technique with 2% agarose gel and then conducted hydrolytic cleavage of the resulting fragment with the restrictase — Avail. Restriction of PCR product was performed at + 37 °C during 12 hours, as indicated in the manufacturer's recommendations. Products DNA fragment amplifiers and amplitude of restriction was separated with 2–3%

agarose gel and was assessed after staining with ethidium bromide in the transmitted (resolving) UV light. Statistical analysis of the results was carried out using «OpenEpi 2009, Version 2.3» statistical software package. The frequency of allele and genotype variants (f) was calculated by the formula: ***f = n/2N and f = n/N***

Results and discussion: The initial stage of our work was the selection and synthesis of oligoprimer to identify polymorphisms Gln551Arg of IL4RA gene. Molecular genetic testing (PCR) of the genetic marker was conducted in the Laboratory of Molecular Medicine and Cell Technologies of Scientific-research institute of hematology and blood transfusion of Ministry of Health of Republic of Uzbekistan. Information about gene pathways and primer's structure was prepared taking into account the original literary source and in GeneBank. A characteristic of genetic marker and synthesized oligoprimer sequence is shown in Table 1.

Table 1. – The sequence of oligoprimers used in PCR

Gene, localization	Polymorphism	Structure of used oligoprimers	Allelic variants after restriction
IL4RA 16p12.1	Gln551Arg	CCCCCACCACCAGTGGCTAC CCAGGAATGAGGTCTTGGAA	Gln551 (125+9 п. н.) Arg551 (116 п. н.)

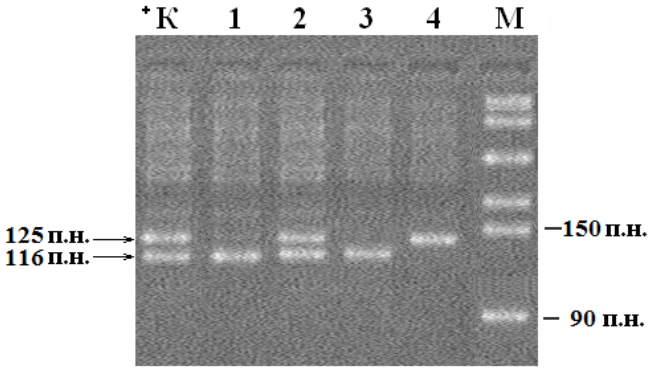

Figure 1. Electrofhoretic detection of polymorphisms Gln551Arg of IL4RA gene after restriction
+K – control; 1 and 3 – normal genotypes; 2 – heterozygous genotype; 4 – mutant homozygouse genotype, M – marker of the fragments sizes.

Table 2. – Allelic variants of polymorphism Gln551Arg of IL4RA gene after amplification and restriction

PCR products of IL-4RA gene.	Before restriction	Allelic variants after restriction with Avail restrictase.
Normal	125 bps	125 bps
Heterozygous	116 bps	125 bps + 116 bps
Mutant homozygous		116 bps + 9 bps

Interpretation of the findings is shown in Table. 1 and Fig.1. As seen, as a result of the PCR analysis the Arg/Arg mutant allele marker was synthesized as a fragment with a size of 116 bp. After restriction there is formation of 9 bps + 116 bps fragments observed at patients with normal genotype of Gln/Gln, But there is no 125 fragment bps, while heterozygous carriers have an amplification of all three fragments (125 bps and 116 + 9 bps). In a purpose to analyze the distribution of frequencies of alleles and genotypes of Gln551Arg of IL4RA gene in combined sample of AD patients and the control group, there was testing of the test system conducted (Table 2).When analyzing the distribution of alleles and Gln551Arg polymorphism's genotype of IL4RA gene was identified a significant prevalence of the mutant allele frequency — Arg551 in patients with AD compared with a group of conditionally healthy donors. There was Arg551mutant allele detected at the main and control groups study in 42/100 (42%) and 14/50 (28%) cases, respectively. The frequency of Gln551wild allele and in the groups was 58/100 (58%) and 36/50 (72%), respectively. In this case, estimated risk probability of (OR) AD progression in carriers of this polymorphism was 1.8 points higher than in carriers of Gln551wild alleles. The findings are statistically valid (X^2=2.79; P=0.09; OR=1.8; 95%CI 0.89–3.88) (Tabl. 3).

Table 3. – Frequency of alleles and genotypes of polymorphism Gln551Arg of IL4RA in patients with AD and healthy donors (control group)

Groups	n(X)	Frequency of alleles				Frequency of genotypes					
		Gln551		Arg551		Gln/Gln		Gln/Arg		Arg/Arg	
		n	%	n	%	n	%	n	%	n	%
Patients with AD.	50 (100)	58	58	42	42	14	28	30	60	6	12
Healthy donors.	25 (50)	36	72	14	28	13	52	10	40	2	8

Comparative analysis of genotypes distribution showed that the proportion of persons with hetero + homozygous mutant genotype of «Gln/Arg and Arg/Arg» among patients and healthy donors was 36/100 (36%) versus 12/50 (24%), respectively. The calculated probability of developing AD among carriers of these genotypes is 4 times significantly higher compared with the control group (X^2=4.17; P=0.04; OR=2.79; 95%CI 1.03–7.56). Significant (firm) predominance of the number of carriers of mutant alleles and genotypes in patients may indicate a pathogenetic connection, is the association between the Gln551Arg polymorphism of IL4RA

gene and formation of AD. The point to be emphasized is that, when comparing Gln/Gln healthy genotype in patients with AD as compared to healthy individuals, it was found more than 5-fold valid reduction in the frequency of occurrence of healthy genotypes (OR = 0.54; 95% CI 0.26–1.12). These data confirm the validity of our results, showing that allele IL4RA- Gln551 is a marker of reduced risk of AD progression in patients. Thus, in the result of the study on IL4RA gene's Gln551Arg polymorphism was found that the DNA locus associated with AD in Uzbekistan. In the initial stages of defining diagnosis on atopic dermatitis it is recommended to conduct genotyping assay of studied gene polymorphisms of cytokines and their receptors for the establishment of further variants of its clinical course and nasty disease-forms-susceptibility. Treatment of atopic dermatitis is recommended to conduct taking into account the genetic data on the dominating nature of its clinical course and evidence of immune status disorders.

References:

1. Sandford A. J., Chagani T., Zhu S., Weir T. D., Bai T. R., Spinelli JJ, et al.Polymorphisms in the IL4, IL4RA, and FCERIB genes and asthma severity. J Allergy Clin Immunol. – 2000. – 106:135–140.
2. Kauppi P., Lindblad-Toh K., Sevon P., Toivonen H. T., Rioux J. D., Villapakkam A., et al. A second-generation association study of the 5q31 cytokine gene cluster and the interleukin-4 receptor in asthma. Genomics – 2001, – 77:35–42.
3. Wjst, Kruse S., Illig T., Deichmann K.: Asthma and IL-4 receptor alpha gene variants. Eur J. Immunogenet – 2002, – 29:263–268.
4. Bottini N., Borgiani P., Otsu A., Saccucci P., Stefanini L., Greco E., et al. IL-4 receptor alpha chain genetic polymorphism and total IgE levels in the English population: two-locus haplotypes are more informative than individual SNPs. Clin Genet – 2002, – 61:288–292.
5. Cui T., Wang L., Wu J., Hu L., Xie J. Polymorphisms of IL-4, IL-4R alpha, and AICDA genes in adult allergic asthma. J Huazhong Univ Sci Technolog Med Sci – 2003, – 23:134–137.

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Experience and comparative analysis of application results of regulated subclavian-pulmonary artery anastomosis in patients with tetralogy of Fallot

Abstract: The article summed up the consolidated analysis of close results of classical subclavian-pulmonary artery anastomosis (Blalock–Taussig shunt) and modified via a vascular Fogarty catheter for patients with Tetralogy of Fallot. It was noted that the major complications in the early postoperative period are hypervolemia of pulmonary circulation, postoperative bleeding and the development of acute heart failure. It is proved that the active application of the author's method for managing cardio-pulmonary hemodynamics using Fogarty catheter allows significantly reduce the mortality rate of 1.6% and avoid anastomosis hyperfunction and the development of cardio-pulmonary insufficiency.

Keywords: Tetralogy of Fallot subclavian-pulmonary artery anastomosis hypervolemia of pulmonary circulation.

Introduction

In infants and young children with strong cyanosis and frequent episodes of acute respiratory failure, as well as in elderly patients with severe hypoplasia of the pulmonary artery and the left ventricle the most common type of surgical treatment is the subclavian-pulmonary anastomosis (SPA) [2]. The increased pulmonary blood flow lead to certain changes in the patient's condition — disappear cyanotic episodes, there are the conditions for cancellation of beta-blockers [1]. However, the increased blood flow through SPA to the left heart can be the cause of such vital complications, such as pulmonary edema and acute left ventricular failure. Postoperative mortality increased to 7.5 during the development of these complications — 15.6% [3].

Until recently in the literature is almost no information about the possible regulating ways of bypassed (shunted) blood volume through the established vascular anastomosis. The RSCS named after ac. V. Vakhidov proposed an original way allowing to adjust the shunt volume through the SPA. However, the authors mainly consider the surgical aspects of the tactical and technical parts of SPA performance.

Since 2009 in RSCS the using of authorial method was started (patent RU number FAP 00560) of regulation of blood flow via SPA.

Materials and methods.

We conducted a consolidated analysis of 930 results of SPA, which made in RSCS named after ac. V. Vakhidov for 33-year period (1976–2013). Classical anastomosis by Blalock-Taussig was performed for 79 and modified anastomosis — for 790 patients. In 61 cases SPA was supplemented by copyright controlling methods of cardio-pulmonary hemodynamics. Of these the ligature were using in 7 patients and for 54 them — Fogarty catheter.

The age of patients ranged from 3 months to 32 years (mean age 13,34 ± 0,04 years). There were 512 male and 425 female. In order to objectively assess the effectiveness of new methodological approaches and developed tactical and technical aspects by using SPA we made comparing of three periods of using SPA in our Center: 1976–1980 years — the period of development and introduction of SPA (93 patients), 1981–1999 — the period of active use of SPA (610) and the period 2000–2013 years — the period of overview the methods of managed SPA (227) (Fig. 1).

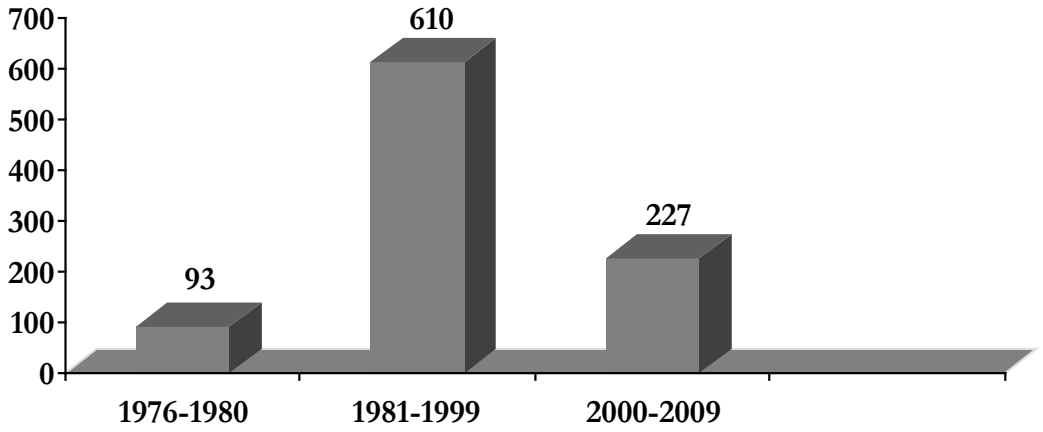

Figure 1. The number of completed SPA by periods (n = 930)

Results and Discussion

Retrospective analysis showed that in the first period was a high postoperative mortality that can be objectively related to the improvement of methods and surgical techniques (Fig. 2).

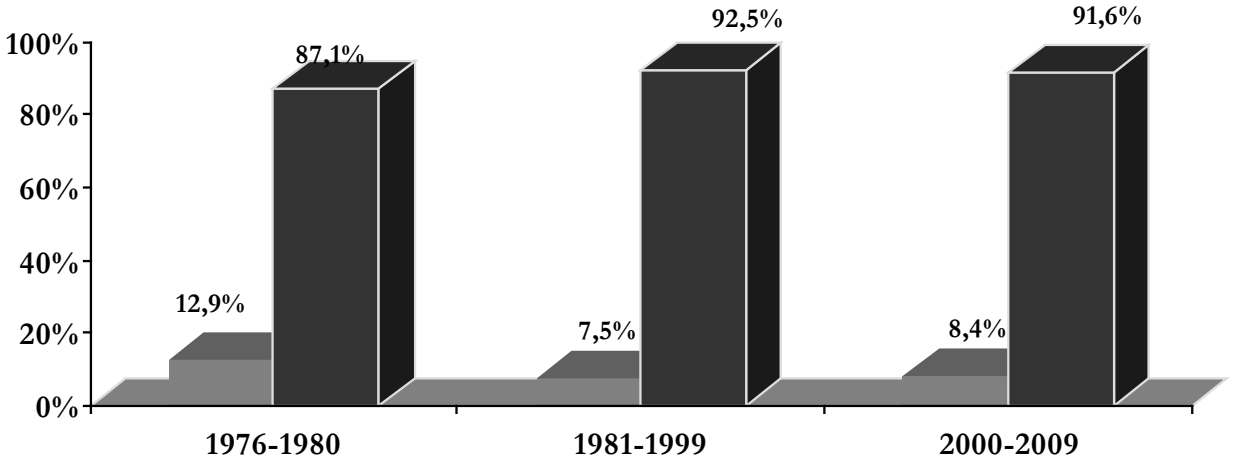

Figure 2. Structure of the SPA results by period (%) in patients with TOF

Part of postoperative patients from 1976 to 1980 was significantly represented in the group with fatality (12.9%), compared with appropriate (87.1%) outcomes (u- 2.66, p <0.001 φ* — 3.75 p <0,01; χ^2–27,43, p < 0.001, T 5.78, p < 0.001). The risk of death for this period of operation was 6.8 times higher. Contingency factor of death causes and these periods (1976–1980 and 1981 –1985 years) was equal to KA — 0.751 and KA — 0.709, respectively.

Correlated tendency that noted in the incidence of a advantageous outcome of the stages of formation of surgical techniques, was in reducing mortality and increasing the portion of positive results. So, for the period from 1981–99, the amount of patients with adequate (positive) outcomes was 92.5% compared to 7.5% with a mortality (u — 2.43, p <0.05 φ* — 1.6, p < 0.05). KA was respectively equal to 0.769 and 0.719.

In comparison, between 2000 and 2013 year, these values were 91.6% and 8.4% respectively. However, it should be noted that such an increase of mortality compared with the second period was associated with the expansion shown in the particular type of surgery in patients with a single (common) ventricle of the heart. The most favorable results of these operations in this period marked in the last three years (2007–2013 years), so the amount consist of 98.4% and 1.6%, respectively (u — 2.42, p < 0.01, φ*- 2.71, p <0,01; χ^2–3,75, p < 0.05, T — 2.32, p < 0.05). KA was respectively equal to 0.757 and 0.729.

The major complications of early postoperative period were:

1. Hypervolemia of pulmonary circulation;
2. Postoperative bleeding;
3. Severe congestive heart failure.

Table 1. – Causes of deaths in the early postoperative period in studied groups

Causes of death	I group	II group	III group
Hyperfunction of anastomosis	4 (0,43%)	11 (1,18%)	3 (0,32%)
Postoperative bleeding;	3 (0,32%)	5 (0,54%)	4 (0,43%)
Severe congestive heart failure;	5 (0,54%)	30 (3,22%)	12 (1,29%)
Sum (abs.)	12	46	19

Note:% – of the total number of operated patients

Thus, in the early postoperative period in 60 (6.4%) patients were noted hyperfunction of anastomosis with the development of hypervolemia of pulmonary circulation that leading to pulmonary edema. In all cases, this complication request the reoperation and elimination of the shunt. Fatal outcome was observed in 18 (30% of the total number of patients with hypervolemia of pulmonary circulation) patients, and all of them, according to the scale «Aristotle» the result were not more than 18 units. Among the 42 survivors in the early stages, 20 of them needed the prolonged ALV for more than 5 days.

Total rethoracotomy were 86 (9.2%), most of them (60) were associated, as noted above, with hyperfunction of the anastomosis with a mortality rate of 30% (18 patients). In 26 (20.2% of the total rethoracotomy) patients with rethoracotomy were conducted because of postoperative bleeding, with mortality rates of 42.3% (11 patients).

Overall mortality was 8.3% (77 patients), of which 37.7% (29 patients) accounted for reoperations and 62.3% (47 patients) was associated with the progression of cardiovascular disease.

From beginning of 2009 year, we started to use method or technic that regulate or controlled anastomosis that located between arteries, which allows to control the volume of blood flow through the shunt SPA on the pulmonary circulation, which leads to a restriction of the blood flow (excretion) in the shunt to side of installed anastomosis. By measuring the gradient between the subclavian and pulmonary arterial system the dosage system of excretion blood into the pulmonary circulation can be regulated. Thus, it avoids the hyperfunction of anastomosis and eludes high pressure in the pulmonary artery, which can lead to cardiovascular diseases.

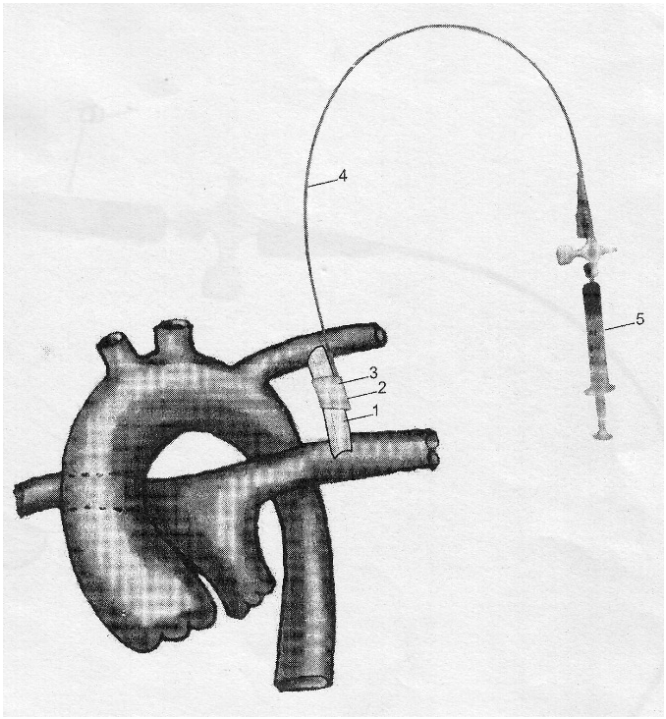

Figure 3. Adjustable subclavian-pulmonary artery anastomosis by using intravascular Fogarty catheter

Conclusions.

1. The clinical material collected in RSCS named after ac. V. Vakhidov during the 33-year period, the introduced unified methodology of improved surgical tactics of patients with TOF proves its high efficiency in the preparatory stage of a radical correction.

2. Analysis of the preoperative examination of studied patients in chronological periods showed that the distribution of patients within the groups, depending on the basic clinical and anamnestic data, objective status, and based on of diagnostic monitoring was equal, as evidence by the magnitude criteria of matching are equal to 1.523 (p <0.05).

3. Satisfactory results of SPA noted for the 2000–2013 period give the motivation to apply and active use of method that manage of cardio-pulmonary hemodynamics.

References:

1. Matsuyama K., Matsumoto M., Matsuo T. Slowly developing perigraft seroma after a modified Blalock-Taussing shunt.//Pediatr. Cardiol. – 2003. Jun-Aug; – 24 (4):412–4/Epub – 2003. – Jan 15.
2. Sivakumar K. Catheter closure of an atrial septal defect in anatomically corrected malposition with left juxtaposition of atrial appendages. Cardiol Young. – 2009. – Sep;19 (5):534–6. Epub – 2009. – Aug 13.
3. Williams J. A., Collardey K. R., Treadwell M. C., Owens S. T. Prenatally diagnosed right ventricular outpouchings: a case series and review of the literature. Pediatr Cardiol. – 2009 Aug; – 30 (6):840–5. Epub –2009. – May 27. – PMID: – 1947–1995.

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Risk factors and features of septic course in infants

Abstract: In this paper we present the data from clinical observations and special studies of 246 children aged from 1 month to 1 year with purulent inflammatory diseases. Clinical monitoring of sick children were held in the branch of Samarkand Pediatric Surgery. In addition, when analyzing septic risk in young children it has been established that the main predictors of the generalization of bacterial infections in early childhood are the causes that lead to the development of acute and chronic hypoxia of the fetus and newborn, as well as the presence of persisting infection in mothers.

Keywords: septic course, children, purulent inflammatory diseases.

According to the modern concept of PIRO (Predisposition, Infection, Reaction, Organ disfunction) the diagnosis of sepsis predetermines identification of predictors, i. e. predisposing factors of the disease, clarification of infectious agent and its localization, assessment of the response of the organism to the infectious agent, and the identification of organ dysfunction.

In this paper we present the data from clinical observations and special studies of 246 children aged from 1 month to 1 year with purulent inflammatory diseases. Clinical monitoring of sick children were held in the branch of Samarkand Pediatric Surgery (director — prof. A. M. Shamsiev).

Patients were divided into groups: I group with sepsis (generalized infection) — is basic 163 patients (of them 109 patients with septicemic form and 54 patients with septikopiemic form). II group — the group of local infection comparisons –83 patients.

In assessing the flow, acuteness, severity of inflammation in sepsis, we used clinical criteria and laboratory parameters were compared with those of a localized infection. Children in this group underwent the smallest period of severe condition and the period of fover, and had a shorter total duration of the disease.

For a detailed analysis of the contributing factors of the disease associated with the development of sepsis were comparison with frequency of these factors at a local infection was carried out. This approach allowed us to build a logical chain in predicting the possible development of sepsis and in the selection of appropriate measures to reduce the adverse outcomes. In this work, a thorough analysis of the psycho-social and medical-biological factors of high septic risk in infants was carried out.

Of psychosocial factors on the frequency of septic group mothers low medical culture was leading: so 84% of mothers showed ignorance and failure to comply with hygiene items, not timely appealed for medical aid, about 59.3% of mothers showed reduced attention to the child: wrong feeding, care, walkings and etc. The contingent of patients, as in sepsis, so at the local infection, was mainly from rural areas: 79.4% and 76%, respectively. It was found that the average age of mothers of the studied was higher group than in the control: 65,7 ± 3,2% of mothers in the control group were between the age of 19–28 years, i. e. during the period of the most active reproductive function. The maximum number of mothers of children with sepsis are located in a range of less than 19 and older than 30 years, which increases the risk of sepsis in infants in 1.5 and 1.8 times respectively. There were no significant differences in nulliparous women over multiparous ones in both groups: the first birth was in 58 (54.2%) women in the group with sepsis and in 14 (48.2%) women in the group with a local infection.

From medical and biological factors we analyzed the factors of perinatal period with peculiarities of pregnancy and childbirth and maternal health during pregnancy.

Comparative analysis of perinatal factors associated with the development of sepsis in infants revealed that the frequency of pathology of pregnancy in mothers of septic children is over 4 times higher than that of mothers of children with local infection.

The structure of the complicated pregnancy. In particular, in toxicosis in 42 (25.7%), in sepsis threat of termination of pregnancy — 54 (33.1%), preeclampsia was observed in 25 (15.3%), polyhydramnios — 21 (12.8%) women. In some cases, there is a combination of complications of pregnancy in a woman.

Complications during childbirth and with significantly greater frequency occurred in the groups with sepsis and made 68% of cases, which is 5 times more likely than in mothers of children with localized infections. Among the complications there were: entanglement of umbilical cord around the neck, premature detachment of normally situated placenta, powerless labor, precipitated labor and they were the cause of neonatal asphyxia during labor.

In the structure of extragenital diseases in mothers of the studied children anemia had a leading position. Anemia of moderate and severe degree in mothers is 4 times more common in the group with sepsis than in the mothers in the group of children with local infection (74.8% — in sepsis, against 18.1% — by local infection).

Also, when carrying out a retrospective analysis of the results of interviews with the mothers of the studied children, it was revealed that they had a high infection index, confirmed by the high frequency

of chronic foci of infection revealed in mothers during pregnancy: chronic tonsillitis, sinusitis, chronic bronchitis, inflammatory diseases of the urinary tract (44, 1% — in the group with sepsis vs. 12.04% in the group with local infection, which is 3.6 times more often than in the group with local infection). The incidence of genital diseases in mothers during pregnancy in both groups was similar.

The above variations in ante- and intrapartum period could contribute to the development of acute or chronic fetal hypoxia by increasing the risk of perinatal brain damage in the child as confirmed by the high frequency of perinatal pathology (hypoxic-ischemic encephalopathy) among children with sepsis — 143 (87.6%) patients that more than seven times higher than the local infections. In addition, the fact of presence of foci of chronic infection in the history of women indicates failure of nonspecific immunological defense mechanisms and factors of nonspecific resistance in the mother, and this is the evidence of presence of infection and persisting infection and possible microbial contamination from mother to child.

The analysis of background premorbid factors revealed that frequency- of lymphatic hypoplastic development and allergic diathesis in both studies groups is almost the same. Deficient conditions in sepsis occur at a high frequency, so severe anemia occurs in virtually every patient with sepsis, whereas in local infection anemia in children was observed 2.5 times less and, as a rule, they have developed anemia of mild and moderate severity. Rickets is 2 times more often developed in the group of septicemic form and apparently is related to the fact that the children in this group had a long period of disease.

It is natural that the development of sepsis on the background of the intensification of catabolic processes contributes to malnourished children' s cachexia. Thus, virtually all children with sepsis had weight deficiency. In 73 (44.8%) patients with sepsis the 1 degree hypotrophy occurred, while in the remaining septic cases (35.6% and 19.6%) hypotrofhy of the 2^{d}-3^{d} degree developed. In local infection incidence of hypotrophy was significantly less: the 1^{st} degree hypotrophy — in 9 (10.8%) children, the 2^{d}- degree hypotrophy — in 7 (8.4%) patients and the 3^{d} degree hypotrophy was revealed in 1 patient (1,2%).

Identified deficient condition were more likely the result of sepsis than predictors of disease.

Analyzing the cause of the disease, and reflecting on the entrance gate of infection in sepsis, we found out that according to mothers information the illness in the studied infants began with the manifestations of intestinal infection in 37.4% of cases, and in 13.8% cases, the manifestation of the disease was observed after or on the background of pneumonia and acute respiratory infection. In other cases, the cause of the beginning of the child's illness was unknown. Although risk factor for catheter-associated sepsis could serve as a fact that — 84 (78.5%) infants studied by us were often for a long time and in the intensive care unit in the community and were receiving infusion therapy through multi-day central venous catheterization. It is impossible to distinguish and clarify in practical life the time of infection. Shabalov N. P., Ivanov D. O. 2002).

Thus, in the formation of septic risk in infants the important role is played by the low level of mothers, health the low degree of attention to the child that determines the development of new directions in health education and preventive measures. In addition, when analyzing septic risk in young children it has been established that the main predictors of the generalization of bacterial infections in early childhood are the causes that lead to the development of acute and chronic hypoxia of the fetus and newborn (complications during pregnancy and childbirth, moderate and severe anemia in mother), as well as the presence of persisting infection in mothers.

References:

1. Aliyev A. F. role of perinatal pathology in the formation of "burden of disease"//Russian Gazette Perinatology and pediatrics. – 2002. – No 3. – FROM. 58.
2. Baibarina E. N., Zubkov V. V., Mikhailova O. I., Tyutyunnik V. L. condition of health of newborns born to women with placental insufficiency and infection//Russian Gazette Perinatology and pediatrics. – 2009. – No 5. – S. 14–19.
3. Gnusaev SF, Shibayev AN, Federyakina OB Cardiovascular disorders in newborns with perinatal hypoxia//Pediatrics. – 2006. – No 1. – S. 9–13.
4. Kasymov Sh. Z., Davlatov S. S. Hemoperfusion as a method of homeostasis protection in multiple organ failure syndrome//Academic Journal of Western Siberia. – 2013. – T. 9. – No. 1. – C. 31–32.
5. Makhmudov OS, Nosirova Sh Factors Affecting during sepsis in infants//Herald doctor. -Samarkand, – 2008. – № 4. – S. 45–46.
6. Mironov P. I., Ivanov D. O., Bulanov A. S., Lekmanov M. A., AW Pilot assessment of the validity terms of the international consensus conference on pediatric sepsis (2005) in domestic ICU//Journal of intensive care. – 2006. – № 4. – 61–64.

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Formation deformity of foot with congenital IV brachymetatarsia

Abstract: The radiological features (linear and angulometric) at 49 patients with congenital shortening of metatarsals are studied and measured. Characteristic changes in forefoot with congenital brachymetatarsia are revealed. Roentgenograms of

one patient with left sided congenital IV brachymetatarsia were studied dynamically before (within 5 years) and after surgery and studied the development typical deformation of forefoot.

Brachymetatarsia can develop further deformation in other departments of foot.

Keywords: Brachymetatarsia, linear and the angulometric radiological parameters, forming typical deformation.

Introduction. Brachymetatarsia is an anomaly of development of foot which leads to a shortening of one or several metatarsals as a result of premature closing of distal epiphyseal plate. Condition isn't shown clinically to age of 7–10 years [3], but Smizzi A. [8] reports detection of cases of brachymetatarsia from 4 years. By 12 years old the shortening compound 15–45% of metatarsal length [7; 2]. Brachymetatarsia can be unilateral or bilateral, at the same time any of five the metatarsals are involved [5], but the shortening of the fourth metatarsal is more often observed [1].

The close anatomic and functional interrelation between structures of foot inevitably leads to emergence of a chain of pathological changes in a case of damage of one of elements [4; 6]. In case of congenital brachymetatarsia except shortening of metatarsals, deformation of forefoot is also formed which often isn't considered by orthopedists. Unfortunately, the mechanism of its forming isn't described in scientific literature. Early knowledge of availability or a possibility of development typical deformation of adjacent foot beams in case of a congenital brachymetatarsia can give invaluable help in treatment of patients, and it is essential to prevention of development typical deformation of forefoot, to improve results of surgical treatment. Otherwise correction of deformation of adjacent beams of foot is required, except lengthening of the shortened metatarsal.

Research purpose — is studying of forming typical forefoot deformity; linear and the angulometric radiological parameters of forefoot with congenital IV brachymetatarsia.

Materials and methods. We studied linear and angulometric radiological parameters of forefoot in 49 patients with congenital IV brachymetatarsia. Unilateral shortening were observed in 23 (13/10) patients and bilateral — in 26 patients. Roentgenograms of one patient with left sided congenital IV brachymetatarsia were studied dynamically before (within 5 years) and after surgery. We determined the following X-ray metric indicators of foot:

I. **The parameters characterizing the shortened metatarsals:**

1. Length shortened metatarsal
2. Lagging of the shortened metatarsal from parabola (mm).
3. The second-fourth angle (normal value-50,5°).

II. **X-ray parameters of forefoot:**

4. M1-M2 distance — distance between centers of heads I and II metatarsals –19.7 mm.
5. M2-M3distance — distance between centers of heads of II and the III metatarsals –12.7 mm.
6. M1P1 angle is formed by between axes I metatarsal (M1) and a proximal phalanx (P1) — normal value 8–16.
7. M1M2 angle — is formed between axes I and II metatarsals- normal value 5–8.
8. M4M5 angle — is formed between axes IV and V metatarsals- normal value 6.5° — 8.
9. M5P1 angle — is formed between axes V metatarsal and proximal phalanx- normal value 0–7.

Results. The analysis data showed average age of patients underwent surgery was 16,4±4,1 years (from 11 to 28 years), average age appearance of brachymetatarsia was — 7,7±1,9 years (from 5 to 15 years). From the moment of detection of metatarsal shortening until the surgery passed from 3 to 6 years, on average 5±0,6 years.

The analysis of x-ray films of patients with IV brachymetatarsia showed that shortened IV metatarsals are thinned, declined from an axis and rotated, heads have spherical shape with the expressed osteoporosis, and there is a goblet form irregular fusion zone (fig. 1).

Figure1. Roentgenogram of patient P. with the congenital bilateral IV brachymetatarsia

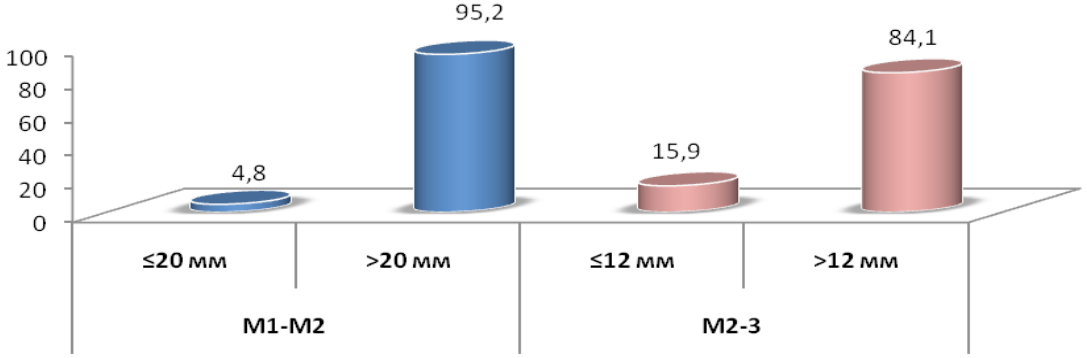


Figure 2. Frequency of occurrence of different distances between metatarsals, %

The average shortening were 17,8±2,8 mm (from 11 mm to 24 mm), that composed 38,2±8,3% from initial length. The second-fourth angle was ranging from 25 ° to 46 ° (on average 36,0±5,42 °). All patients had an angle of shortened metatarsal ≤50,5°. Distance between M1-M2 and M2-M3 were respectively 24,2±2,3 mm (from 20 to 32 mm) and 13,7±1,4 mm (from 10 to 18 mm). The majority of feet had in distance between M1-M2> 20 mm (95,2%) and between M2-M3> 12 mm (84,1%) (Fig. 2).

M1P1 angle was average 21,1±7,7 ° (from 10 ° to 45 °). M1M2 angle was before treatment 12,4±3,4 ° (from 6 ° to 20 °). At most of patients feet M1P1 angle were more than 16° (74,6%) and M1M2 angle deviation more than8° (93,7%) (Fig.3).

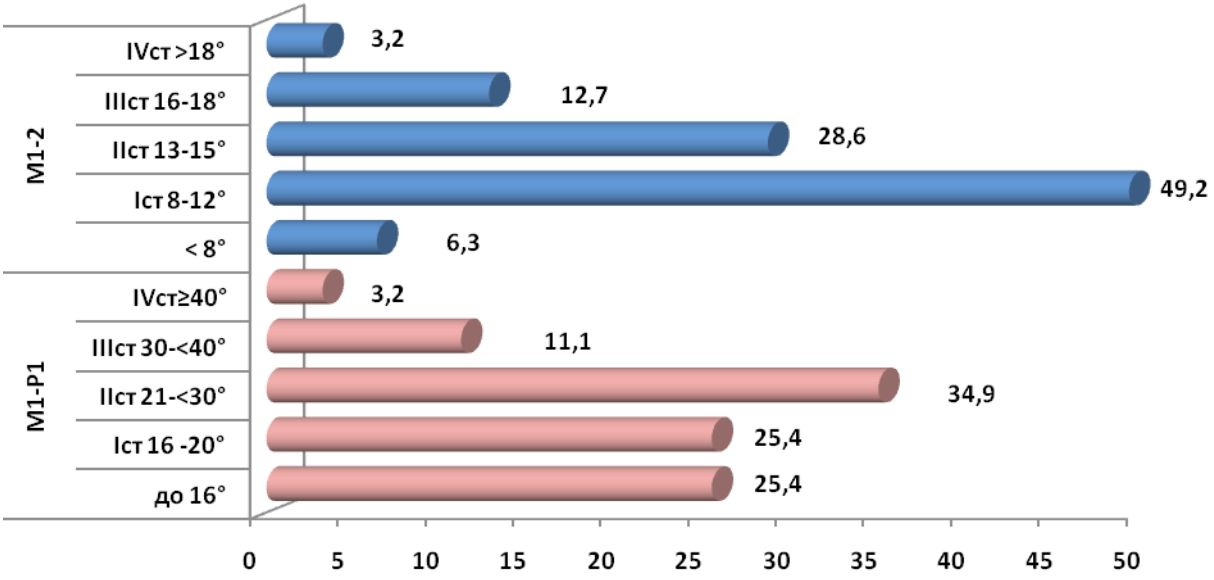


Figure 3. Prevalence of patients on degree M1-P1 and M1M2 angles,%

M4M5 angle in feet was average 11,3±3,2 ° (from 5 ° to 20 °). M5P5 angle initially fluctuated in the range from 0 ° to 20 ° and has averaged 7,8±4,5 °. At most of patients M4M5 and M5P5 angles has turned out > 8 ° (79,4%) and <12 ° (81,0%) respectively (Fig.4).

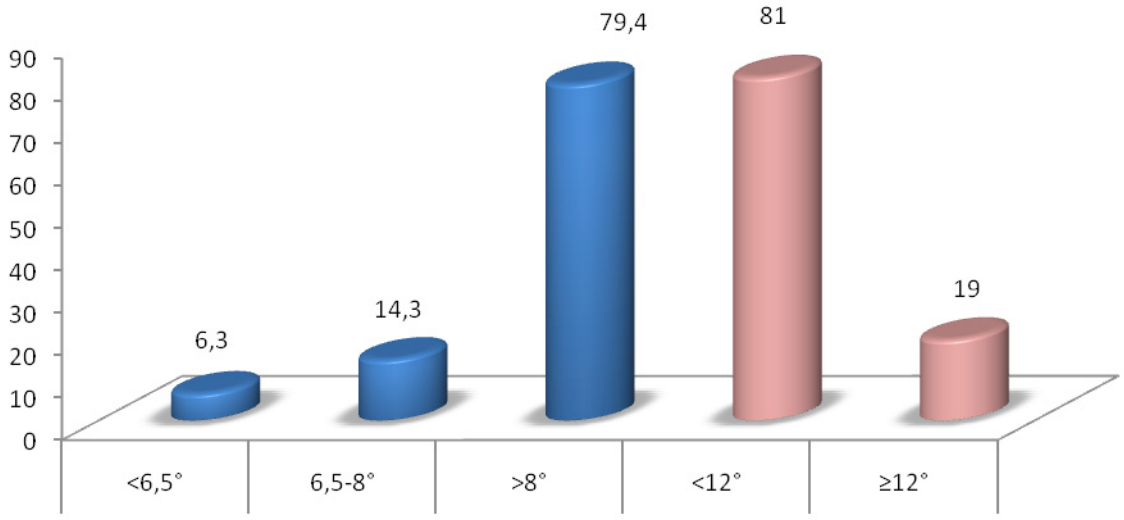


Figure 4. Prevalence of patients depending on a deviation M4M5 and M5P5 angles,%

On table 1 linear and angulometric radiological parameters of forefoot patient ´s A. with congenital left sided IV brachymetatarsia are shown in dynamics before and after surgery. The patient underwent X-ray annually. Brachymetatarsia of IV metatarsal was firstly diagnosed in 2009 at the age of 8. But no treatment was offered. Surgery (callus distraction with Ilizarov´s devise) was performed in 2014. Term of treatment was 153 days.

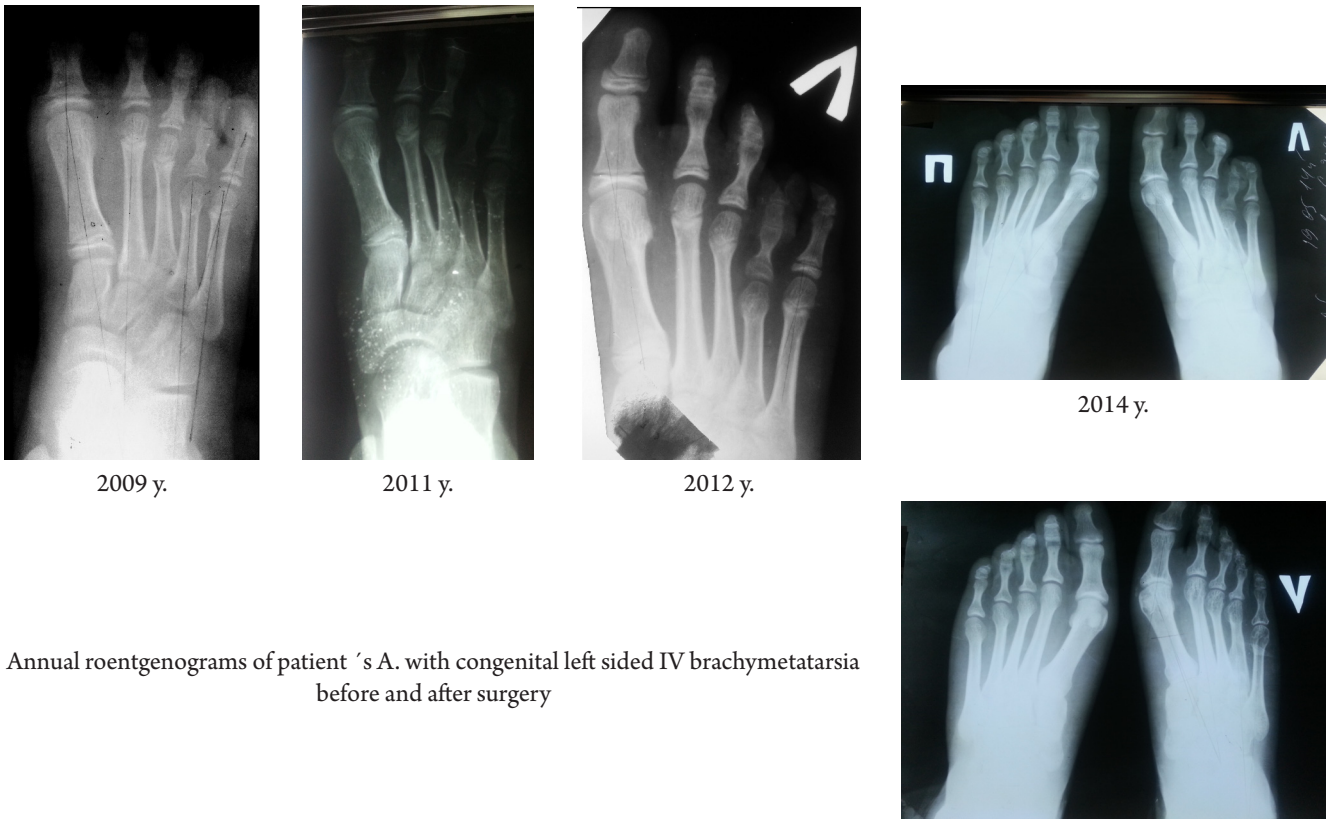
Table 1.

	2009 y.	**2012 y.**	**2014 y.**	**2016y. (after treatment)**
1	***2***	***3***	***4***	***5***
Length of M1 (mm)	45	52	55	57
M2 (mm)	52	62	63	65
M3 (mm)	50	60	62	64
M4 (mm)	40	42	42	62
M5 (mm)	49	60	64	67

1	*2*	*3*	*4*	*5*
P4 (mm)	16	17	17	17
M1 M2 distance (mm)	20	21	23	20
M2 M3 distance (mm)	11	13	13	12
Angle M1 P1,°	9°	13°	25°	30°
Angle M1 M2,°	10°	10°	15°	14°
Angle M4 M5,°	5°	12°	15°	4°
Angle M5 P5,°	Valgus 8°	Valgus 8°	0°	0°

The length of normal metatarsals had increased within 5 years: M1 to 12 mm, M2 to 13 mm, M3 to 14 mm and M5 to 18 mm. And length of the shortened M4 before operation has increased only to 2 mm. The length of P4-main had increased only to 1,0 mm. Distance of M1M2 has increased within 5 years to 23 mm, and after surgery have decreased to 20 mm. The same tendency is noted when studying M2M3 distance. Angulometric parameters have shown that they increased in dynamics to surgery in comparison to healthy foot. After surgery M1M2, M4M5, M5P5 angles haven't changed, but M1P1 angle continued to increase. All these changes show formation of transversal flatfoot and hallux valgus (fig. 5–8.).

Table 2.



2009 y. 2011 y. 2012 y. 2014 y. 2016 y.

Annual roentgenograms of patient ´s A. with congenital left sided IV brachymetatarsia before and after surgery

Thus, radiological changes of foot with brachymetatarsia point to malformation of the foot skeleton relation that can lead further to deformation in other parts of foot. IV brachymetatarsia is followed by metatarsus varus and hallux valgus, shortening of proximal phalanxes. Patients shall be dynamically to be observed. Conservative treatment of congenital IV brachymetatarsia shall be early and is directed to preventions of adjacent beams deformation.

In general, the research showed that congenital IV brachymetatarsia is characterized by the progressing development of deformation not only in the shortened IV metatarsal, but also in adjacent the metatarsals. Often these accompanying changes require conservative or surgical treatment.

References:

1. Al Kline, Endolyn Garden. Brachymetatarsia: One-Stage Correction using a Cadaver Bone Allograft. The Foot and Ankle Online Journal – 2 (5): 1. – Volume 2, – No. 5, – May – 2009.
2. Bahubali Aski, Devendra Kumar P., Mohan Patil C., Shashidhara H. A rare case of bilateral idiopathic brachymetacarpia and brachymetatarsia. International Journal of Advances in Medicine Int J Adv Med. – 2014 Aug; – 1 (2):162–164.
3. Bartolomei FJ. Surgical correction of brachymetatarsia. J Am Podiatr. Medical Assoc. – 80:76–82, – 1990.
4. Brenner E. Insertion of the tendon of the tibialis anterior muscle in feet with and without hallux valgus. Clin Anat. – 2002. – May. – 15 (3). – 217–23.
5. Choudhury S. N., Kitaoka H. B., Peterson H. A. Metatarsal lengthening: case report and review of the literature. Foot Ankle Int – 1997. – 18:739–745.

6. Coughlin M.J and E. Freund, – 2001. The reliability of angular measurements in Hallux Valgus deformities. Foot Ankle Int, – 22 (5).
7. Kirkos M, A rare case of bilateral idiopathic brachymetacarpia and brachymetatarsia. Acta orthopedica Belgika. – Vol. 65. – 4–1999, – 532–535.
8. Schimizzi A., Brage M. Brachymetatarsia. Foot And Ankle Clinics [Foot Ankle Clin], – ISSN: 1083–7515, – 2004. Sep; – Vol. 9 (3), – P. 555–70.

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Epidemic encephalitis: clinical features, diagnosis, modern treatment methods

Abstract: Epidemic encephalitis was first described by Viennese neurologist Professor KA Economo in 1915 during an epidemic in Austria. In 1918–1926 the disease was mass distributed and enveloped in a pandemic a number of European countries. However, according to the authors [1,2,7] many etiology and pathogenesis questions, diagnosis and drug therapy are still not fully studied and this makes scientists turn to this problem again. **Objective:** To analyze the modern methods of diagnosis and treatment in the clinic of epidemic encephalitis**.**

Keywords: epidemic encephalitis, encephalitis, modern treatment methods.

The acute stage of the disease begins with fever which reaches up to 38–39 °C. In addition to fever patients have a headache, muscle pain, nausea and vomiting, and they suffer from intoxication symptoms such as weakness, lethargy, catarrhal phenomena in the upper respiratory tract. The fever period lasts about 14 days. Neurological symptoms, such as drowsiness, start developing. The patient sleeps for two — three weeks with only short periods of awakening [6]. Pathological insomnia is registered in rare cases [2]. The patient can sleep neither during the night nor during the daytime. This can cause sleep and wakefulness disorders, which means the patient is constantly sleeping during the day and is awake at night. Insomnia and pathological sleepiness can replace each other. A characteristic symptom of the acute phase of the disease is considered to be the affection of the nuclei of oculomotor nerves such as drooping eyelids, diplopia, anisocoria, vision palsy and blurred vision due to paresis of accommodation. The photoreaction of pupils to light is missing, which is the main pathognomonic symptom of epidemic lethargic encephalitis [2; 5].

The chronic stage of the disease is characterized by extrapyramidal disorders that manifest in hyperkinesis such as choreoathetosis, athetosis, myoclonus, eye seizures and akinetic-rigid syndrome which includes amimia, akinesia and tendency to catatonia [6].

Mental disorders such as visual, auditory and olfactory hallucinations and changes in perception can occur in the acute stage of the disease. Disorders of the cardiovascular system, hyperthermia, consciousness disorder, respiratory rate and respiratory rhythm disorders may develop and it can lead to death due to heart and breathing failure in severe forms of the disease.

It is impossible to determine the epidemic encephalitis incubation period definitely. The acute stage lasts from 2 days to 4 months. Almost half of the cases of the acute phase is transformed into a chronic one, which is characterized by parkinsonism, slurred speech and slowness. Besides parkinsonism frequent endocrine disorders, such as infantilism, diabetes insipidus, menstrual disorders and obesity can develop. These pathological changes can cause mental disabilities, children suffer from increased aggression, eroticism, agitation [1].

Thus, it is found that the basis for diagnosis of epidemic encephalitis is a combination of sleep disorders with psychosensory disorders and symptoms of oculomotor nerves. The cerebrospinal fluid in the acute stage of the most patients has pleocytosis-40 cells in 1 mm and a slight increase in protein and glucose content. The blood analysis shows leukocytosis with an increase in the number of lymphocytes and eosinophils, as well as an increase in ESR [1; 2].

The diagnosis of the chronic phase of the epidemic encephalitis is based on Parkinson's syndrome, endocrine disorders of central genesis, mental disorders. Today this disease occurs rarely and develops atypically. The majority of cases happen in winter and spring. Epidemic encephalitis affects all age groups of people, including children and the elderly, but people within the age group from 20 to 40 have more risk to catch this disease. Not clear asymptomatic and

atypical forms play a great role in the epidemiology of this disease, which prevail over the symptomatic cases [3].

The treatment of epidemic encephalitis at any stage is inefficient and very difficult. There are no specific drugs today. If the disease is identified in the acute form, anti-viral medicine is prescribed, usually Interferon Gamma Globulin. The treatment in the chronic stage of epidemic encephalitis is done with drugs of the cholinolytic range, mostly synthetic compounds Cyclodol or Tropatsin. It is prescribed 1 mg or 2 mg of Cyclodol 2–3 times a day. In the case of side effects such as dryness in the mouth, accommodation disorder, palpitations, dizziness the dose should be reduced. They prescribe 10–12.5 mg Tropatsin 1–2 times a day, it is possible to increase the medicine up to 20 mg if there are no side effects; the daily dose can be 20–50 or even 75 mg.

A more effective method of treatment in many cases of Parkinson's disease is taking L-Dopa, a dopamine predecessor. The drug gets into the blood-brain barrier and compensates for the lack of dopamine in the basal ganglia. The effect of L-Dopa treatment does not depend on the etiology of the disease, its duration, age or sex of patients and the severity of symptoms. The most effective treatment is using L-Dopa in combination with the previously used anti-Parkinsonian medicine — Cyclodol and its analogs, as well as some of the antisensitizers such as Dimedrolom, Suprastin.

L-Dopa treatment is used in a certain pattern, which provides a gradual increase in dosage, and amount of drug within a few weeks. It starts with the initial dose of 0,125 g per day with gradual increase up to 0.25 g. A good therapeutic effect is reached when using different dosages, generally starting with 2g per day and increasing the dose up to 5–6 g. per day. The drug effectiveness is reduced when it is used long term, a patient may experience the on-off effect, when the state of stiffness is immediately replaced by the state of hypotension and hyperkinesis and vice versa. Positive results of L-DOPA treatment and its derivatives is observed in approximately 70% of patients. Some of them return to their normal life, even restart working.

In recent years a number of drugs such as Midantan and some other antidepressants are used for the treatment of patients with Parkinson's disease. But they are less effective than L-DOPA, though they can be successfully applied in a complex treatment in combination with L-Dopa, especially Midantan. For some patients, especially those suffering from hyperkinetic forms, a surgical treatment is necessary. It consists of stereotactic operations aimed at destroying mainly the ventrolateral nucleus thalamus [1; 2].

There are also different methods of surgical treatment of Parkinson's disease, in which the chemicals (Novocaine and Alcohol) destroy thalamo subcortical connections. This leads to a decrease in muscle tone and disappearance of hyperkinesis.

Conclusion: Sporadic cases of epidemic encephalitis exist nowadays. Potentially they can cause an epidemic. The causative agent of epidemic encephalitis is transmitted by droplet infection. This disease is contagious, and in each case the patient must be isolated. The treatment is symptomatic. Antiviral drugs such as Deoxyribonuclease, dehydrating agents, B vitamins and ascorbic acid are the most effective forms of the therapy in the acute phase of the disease today. Neurotrophic and neuroprotective drugs are used in the chronic form of the disease, they are also effective for the treatment of the secondary parkinsonism, symptomatic epilepsy, the correction of the endocrine and autonomic disorders.

References:

1. Bogadelnikov I. V., Prokudina L. I. Zdyrko E. V. Bezdolny T. N. Differential diagnosis of acute stroke and viral encephalitis. Crimean State Medical University named after S. I. Georgievskogo. Guidelines for doctors. – Simferopol, – 2009. – 690 p.
2. Gusev E. I., Konovalov A. N., Skvortsova V. I. Neurology and Neurosurgery: – M: GEOTAR – Media, – 2007. – 608 p.
3. Karpov I. A., Kachanko E. F., Vasilenko A. I., Gorbich J. L. Nightingale I. V. Encephalitis in clinical practice. Is it simple? (Review of practical recommendations for the treatment of patients with encephalitis of the American Society of Infectious Diseases) – 2011.
4. Karpov S. M., Baturin V. A., Telbuh V. P., Frantseva A. P., Belyakov N. A., Ciechanowski L. V. Autoantibodies to myelin basic protein and its role in demyelinating processes. Clinical Neurology. – 2013. – No 3. – P. 28–31.
5. Schneider N. A., Dmitrienko D. V. Late diagnosis of the chronic form of epidemic encephalitis. Siberian medical review. – 2007, – No 333, – P. 12–49.
6. Yarosh A. A., Krivoruchko I. F., Dracheva Z. I. Nerve diseases textbook. – 1985. – 463 p.
7. Arvind K., Deepti Sh., Rashmi K., Mohammad Z. I., Usha K. Misra, Tapan N. Dhole. An epidemic of encephalitis associated with human enterovirus B in Uttar Pradesh, India. Journal of Clinical Virology, – 2011–06–01, – Volume 51, – Issue 2, – P. 142–145.
8. Karpov S. M., Dolgova I. N., Vyshlova I. A. The main issues of topical diagnosis of nervous system diseases. Stavropol – 2015.

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The condition of endothelial system under nephropathy genesis

Abstract:

The aim: to define interchange condition of nitrogen oxide components in blood within different variants of nephropathy**.** **Methods:** there were used 40 rabbits of both sexes by weight 1500–2500 gr. Animals were divided into 4 groups: 1) control group — 10 intacted rabbits; 2) the first group — rabbits with chronic nephropathy; 3) the second group — rabbits with

nephropathy under diabetic angiopathy 4) the third group — rabbits with chronic kidney disease under diabetic nephropathy. **Results:** analysis testified difference between arterial and mixed venous blood in NO systems of intacted animals while under diabetic nephropathy activity NOS of arterial blood declined. Depending on disease severity reproduction of different kinds of nephropathy differed by increasing NADPH dependent on HP in expired breath condensate. The lowest meaning we observed in animals with chronic toxic nephropathy. **Conclusion**: conducted impact analysis of concentration in blood and in expired breath condensate among animals with chronic toxic nephropathy indicated predominance of productivity in anatomical airway.

Keywords: nephropathy, endothelial system, lung barrier function.

The chronic kidney disease takes particular place among chronic non-communicable disease, because it spread widely, it leads to worse life quality, death and it demands expensive therapy — dialysis, kidney transplantation.

Many years the problem of chronic kidney disease was not paid attention much. Flurry of interest appeared in the beginning of XXI century, when data from epidemiological researches (NHANES and others.), showed high frequency of decreased kidney function and dialysis service did poor job, in spite of opening new dialysis centers, with great number of patients. In 2005 USA 6,4% of Medicare budget. Spending goes up 7,7% annually. In the EU spending goes up 2% from budget of public health service.

The pathogenesis of ChKD under vascular events of diabetes is not investigated thoroughly. The main role takes endothelium dysfunction and breach of vascular system in ChKD under diabetic angiopathy. Nitrogen oxide — free radical brings about endothelium — dependent vasodilation, abscopal trombocyte aggregation leukocyte adhesion to endolethelium and proliferation of smooth muscle sell V. W.

Formation of NO hails from L-arginine by synthesis NO [1; 2; 6; 8]. Statical express of ferment which catalyze formation of nitro oxide is in endothelium and thrombocyte [7; 10]. In macrophage, neutrophil, hepatocytes mesangeal and smooth muscle cells fusion determines inducible synthesis (iNOS), that activate production of nitrogen oxide to 10 times, herewith NO acquired cellulotoxic properties [4; 9].

During learning NO in pathogenesis of ChKD under diabetic nephropathy we got discrepant data, that connects with differences of clinical profiles and different methodological approaches to synthesis NO. some authors judging by activity of cells in particular, thrombocytes; other researchers found its reduction, another fixed increasing [2; 6; 7].

Alternate approach based on level NO integral estimate by content stable products, its oxidation of nitrates (NO_3) and nitrites (NO_2) in blood and urina. There were discovered normal, increased exponents of nitrogen oxides metabolites in patients' blood plasma [2; 10].

In view of the above, the aim of our research is assessment of interchange nitrogen oxide in blood over time with different kinds of nephropathy.

Material and research methods. there were used 40 rabbits of both sexes by weight 1500–2500 gr. Animals were divided into 4 groups: 1) control group — 10 intacted rabbits; 2) the first group — rabbits with chronic nephropathy; 3) the second group — rabbits with nephropathy under diabetic angiopathy 4) the third group — rabbits with chronic kidney disease under diabetic nephropathy.

Experimental chronic nephropathy was reproduced via A. K. Mitciev's method by using lead acetate. Experimental model of chronic kidney disease under diabetic nephropathy we carried out by our own method [5].

Division of animals according to several types of nephropathy in relation to glomerular filtration rate, which is identified by creatinine clearance method [1; 8].

Endothelial system investigated by nitrates indicators, nitrites, and the enzymatic activity of NO-synthase in blood, which was determined by the Griss method in the modification of A.P Solodko. [6]. In this study we were taken for various tests of mixed venous and arterial blood at fixed endovasal catheters and of expired breath condensate. For condensate collection of expired air we used corresponding device generated by S. V. Fedotov in auth [2; 4; 9].

Attained results and its discussion. Research includes: in control group mixed venous blood contains in average 17,51±1,54 umol/l. In arterial blood sample the level climbs to 26,61±3,45 umol/l. Herewith veno-arterial difference is composed of «+» 9,1±0,54 umol/l was basic to all animals from this experience. This tendency confirms common record of predominant content in arterial blood in comparison with venal blood, on the other side our experience identifies importance of endothelial system of lung in these transformations.

Attained analysis results showed that there is great difference between arterial and mixed venous blood in activity of NO-system intacted animals. In arterial blood sample the level of stable metabolites transcended NO significantly the meaning of mixed venous blood on 55,5%, activity NOS — to 99,6%, activity of NADPH- dependent on NR (mark iNOS) was onferior to 56,5%, and ONO_2^- — to 60,3% (table 1).

Consequently, obtained data proclaim that depending on endothelial system of lung the activity level NO is changed in arterial and mixed venous blood. Arterial blood is more impregnated by concentration of NOS. The low level ONO_2, can be related to doldrums activity of NADPH- HP.

Such relationships among level of main stable metabolites NO, NOS, NADPH- HP and ONO_2^- support stable level in arterial, mixed venous blood, resistibility of endothelial system RES and low rate of reactive connections, that conditioned by ferment strength NADPH- HP and concentration. Resistibility rate in arterial blood exceed in mixed venous blood to 2,84 times, but reactive connections were beneath of level to 1,15 times.

Table 1. – Control rates of NO-system in mixed venous and arterial samples of intacted animals, M±m

Exponents of NO-systems	Blood samples		Venous arterial difference
	Mixed venous blood	Arterial blood	
NO (umol/l)	17,51±1,54	26,61±3,45*	«+» 9,1±0,54
NOS (umol/min/l)	3,92±0,11	6,73±0,19*	«+» 2,8±0,09
NADPH — dependent HP (umol/min/l)	0,33±0,04	0,2±0,09*	«–» 0,13±0,01
ONO_2^- (umol/l)	2,61±0,08	1,7±0,2*	«–» 0,91±0,02
Factor of Villibrant (umol/l)	0,65±0,06	0,1±0,01*	«–» 0,55±0,05

** significant difference of arterial blood samples from mixed venous p<0,05*

Obtained data proclaim that limiting factor of resistibility in endothelial system is venous blood inflow with high in content of cellulotoxic connection in particular ONO_2. Within development of different variants of nephropathy, these resistance relations of endothelial system and reactive connections can be changed.

Among animals with chronic toxic nephropathy on the 10th day of pathological process the level of NO in mixed venous blood increased to 24,61±1,74 umol/l (p<0,05), whereas in arterial sample this level declines to 19,22±1,23 umol/l (p<0,05). The next 20-th and 30-th days discovered tendency to normalization of content of NO in mixed venous (19,35±2,32 umol/l; p<0,05 and 18,04±1,24 umol/l; p<0,05 correspondingly), the same in arterial (29,62±1,47 umol/l; p<0,05 and 27,41±2,14 umol/l; p<0,05 correspondingly) in blood samples, however their meaning were higher than control meaning.

Venous arterial difference on 20-th day of experimental research was increasing to «+» 10,27±1,24 umol/l (p<0,05), and on 30-th day it included «+» 9,37±1,4 umol/l (p<0,05).

In all learning cases the identified character was identical. Animals with experimental model of nephropathy under diabetic angiopathy on 10th and 20th day were characterized by maximal content of NO in mixed venous blood got 38,81±5,21 umol/l (p<0,05) and 30,63±4,85 umol/l (p<0,05) correspondigly. This increase in comparison with control series of experiments was 2.2-fold on 10th day and 1.6 times at the 30th day studies.

The increased content of NO in mixed venous sample may be connected with importance of peripheral endothelial system and the general trend of development of diabetic angiopathy. Although level of NO in the mixed venous blood sample at the entrance to the lungs by the 30th day of the experiment decreased in relation to the 10 th day of 1.85 times (p <0.05), and in relation to the 20 th day of 1 46 times (p <0.05), respectively, however, compared with the control group given indicator experiments was 1.19 times higher (p <0.05). This in turn indicated that the level of NO in the mixed venous blood sample testified preserving transformations in organic endothelial system during diabetic angiopathy.

At the same time arterial sample of animals with nephropathy under diabetic angiopathy was characterized by the lowest meaning of NO in comparison with control group (p<0,05). In consideration of minimal meaning NO in arterial sample came to 20 th and 30 th day of experimental research (less than control meaning in 1,7 an 1,4 times).

The 30-th day of experimental research characterized by increased level of NO in comparison with experience period of 1,3 (p<0,05) and 1,1 times (p<0,05) correspondently, but less than control meanings in 1,24 times (p<0,05).

The great changes were discovered in relation to venous arterial difference. On 10th and 20th day under increased meanings of NO in mixed venous sample, difference was changed, getting proportional to the value. A negative meaning of indicator at the outlet from lung endothelial system was due to the vasodilatation of the capillary vascular system with the development of stasis and dysfunction of microcirculation in lungs that was stated by us during the morphological studies of lung tissue.

30-th day there was appeared low venous arterial difference in average from 0,3 to 0,8 during experimental research.

Analysis result of research discovered that under diabetic nephropathy in arterial blood activity of NOS declines. Similarly, reduced activity of this enzyme in the mixed venous blood. Thus, the dynamics of NOS activity in the mixed venous blood in patients with diabetic nephropathy was below the benchmark data — by 39.4% (p <0.05); 28.4% (p <0.05) and 17.7% (p <0.05)accordingly the terms of observation.

The similar changes of ferment NOS activity appeared under toxic nephropathy. Consequently, Consequently among the possible causes of decline in main stable NO metabolites, NOS activity is inhibition of arterial and mixed venous blood at various etiologies nephropathy.

NADPH — dependent HP takes part in normal physiological condition of oxide NO in NO_2 and vice versa: — NO_2 ions are reduced to NO. In condition of endoxemia and hypoxia web arises excess that can become cause of oxidation NO into nitrites (NO_2) and nitrates (NO_2). In this case, NADPH- dependent on HP, and also iNOS, promotes biotransformation on nitrates (NO_3) nitrites (NO_2), after to NO, which over distress grows in web in 100 or 1000 times more, than during reaction with NOS. in view of the above, special place takes learning NADPH dependenton HP in arterial and mixed venous blood analysis of animals with different types of nephropathy.

Obtained analysis of research demonstrated that after nephropathy model under diabetic angiopathy activity of NADPH dependent on HP grew after 10 days in arterial blood to 50%, 20the and 30-th day kept remain arisen among intacted animals (p<0,05).

In mixed venous blood tendency is saved the same. After 10th day activity of NADPH dependent on HP exceeded data marked in intacted animals, on 88,7%, through 20-th and 30-th day — to 49,6 и 24,8%% accordingly (p<0,05). Venous arterial difference exceeded the main meaning in all periods of experience to 2,15 times to 10-th, in 1,8 times to 20-th and 30-th day of experimental researches (p<0,05).

Consequently, animals with nephropathy in diabetic angiopathy background of arterial and mixed venous blood samples have a high activity of NADPH — dependent on HP.

Similar in character and focus on results is registered over analysis of NADPH dependent HP in mixed venous and arterial samples among animals with toxic nephropathy. Activity of this ferment in arterial blood among intacted animals after experimental research exceeded on 10th day to 25%, then to 20th и 30th day data from animals did not differ.

Thus, the animals on the background diabetic nephropathy, angiopathy activity NADPH — dependent on HP in the mixed venous blood was higher than in the arterial blood; on the 10th day of the simulation by 51.7% (p <0.05), 20 th and 30 th day — 53.6 and 56.1% (p <0.05), but after playing a toxic nephropathy, according to these periods of experience — by 58.5% (p <0.05), 65.6% (p <0.05) and 61.3% (p <0.05).

So, the analysis of the results showed that after the modeling of different variants of nephropathy in the arterial and mixed venous blood samples increases the activity of NADPH — dependent HP whose level of activity is significantly higher in the mixed venous blood, arterial than. These data suggest that the animals in the blood should be increased NO content. In our experiments the level of arterial blood in animals with various embodiments nephropathy reduced, and mixed venous, increased conversely.

Among possible reasons of NO, NOS, NADPH — dependent on HP in arterial and mixed venous blood over animals with different types of nephropathy can be process of formation peroxynitrites (ONO_2^-). Intense formation ONO_2^- can be result of hyper expression NO and high level in blood of superoxide-radical (O_2^-), which oxidize from NO to ONO_2.

Investigations have shown that after the modeling background nephropathy of diabetic angiopathy in arterial and mixed venous blood level exceeds $ONO2^-$ data identified in intact animals after 10th day experience 1.4 times and 1.74 times through 20-th day — 1.3 times and 1.5 times, after the 30 days — the same 1.1 times in the respective blood samples.

Consequently, after a reproducing nephropathy, as well as against the background of diabetic angiopathy, there is a significant increase in blood ONO_2. It should be noted that in figure ONO_2 mixed venous blood was significantly higher than in the arterial blood as in animals with background nephropathy of diabetic angiopathy, and without it.

Thus, studies have shown that the type of nephropathy model dependent changes in NO-system activity in arterial and mixed venous blood.

Analyzing obtained data of condition NO — system in arterial and mixed venous blood it should be pointed out that after experimental reproduction of nephropathy under diabetic angiopathy, particularly with ChKD exponents NO, NOS, and iNOS were more affected than among animals with chronic toxic nephropathy.

In such in manner, conducted researches demonstrated that activity of NO-system in arterial and mixed venous blood depended on presence of angiopathy and ChKD development. At the same time, it's necessary to mark that activity of NO-system in our researches limited with characteristic as hyperexpression NADPH — dependent on HP and ONO_2^-. NADPH — dependent on NR provided increasing NO, тогда when level of ONO_2^- depended on O_2^- and NO^-.

Researches of expired breath condensate among animals with different kinds of nephropathy detected ambiguous dynamics in relation to NO concentration change. Concentration of expired breath condensate on 10th day in all experiences of pathologic behavior descending in relation to control group of experience.

Concentration NO in condensate of expired breath on the 10-th day of toxic nephropathy reduced in relation to control group of experience in 1,2 times, when the nephropathy under diabetic angiopathy, the level of condensate was less than control meaning in 1,4 times. In the next periods of experiences on the 20-th and 30-th days concentration of expired breath condensate were increasing in comparison with 10 th day of experience where variant of chronic toxic nephropathy from 0,154±0,09 umol/l ($p<0,05$) to 0,168±0,07 umol/l ($p<0,05$) и 0,195±0,10 umol/l accordingly ($p<0,05$).

The same picture was in relation to concentration of expired breath condensate NO among animals with nephropathy under diabetic angiopathy, where given exponent was also increasing gradually in regard to 10-th day of experience; on 20-th и 30-th day from 0,133±0,09 umol/l ($p<0,05$) to 0,141±0,05 umol/l ($p<0,05$) and 0,172±0,04 umol/l accordingly ($p<0,05$).

Consequently, development of different kinds of nephropathy was accompanied by undulating changes in concentration of expired breath condensate NO. The foundation of this changes was increment of their levels to pathologic behavior. At the same time, progressive azotemia was accompanied by scalling-down concentration in expired breath condensate NO.

Investigation of NOS activity in exhaled breath condensate in animals with various embodiments nephropathy also revealed mixed trend towards its change.

The similar situation was marked in regard NOS activity in expired breath condensate over animals with chronic nephropathy under diabetic angiopathy, where givent exponent was growing gradually to 10-th day on 20-th and 30-th day from 0,349±0,084 umol/min/l ($p<0,05$) to 0,402±0,074 umol/min/l ($p<0,05$) and 0,516±0,046 umol/min/l accordingly ($p<0,05$).

Consequently, development of various types of nephropathy, as in case of NO, was accompanied with undulating changes in activity NOS in expired breath condensate, the base was growing of levels over development of pathologic behavior.

Activity of NADPH — dependent on HP in expired breath condensate over various types of nephropathy was on 10-th day of modeling pathologic process, it was growing in comparison with previous experiences among animals with chronic toxic nephropathy in 1,4 times, while the nephropathy under diabetic angiopathy — in 1,54 times. The tendency to growing of NADPH activity — dependent on HP in expired breath condensate among animals with nephropathy on 20-th and 30-th day after researches was pointed out the nephropathy under diabetic angiopathy.

Thus, the reproduction of of different variants differ nephropathy certain regularity in the increase in the activity of NADPH — dependent HP in expired breath condensate, depending on the severity of the disease. The lowest values (almost at the level of control) have been observed in animals with chronic toxic nephropathy.

At the same time, growing of DADPH — dependent on HP in expired breath condensate among animals with nephropathy under diabetic angiopathy was higher than among animals with chronic toxic nephropathy in 1,83 times.

In comparison with diabetic nephropathy, these changes were 2.2 times more. In other words, the activity level of NADPH — dependent HP in expired breath condensate in animals with various embodiments nephropathy entirely depends on the severity of the pathological process. The harder the course of the pathological process, the higher the activity of NADPH — dependent HP in expired breath condensate, and vice versa.

ONO2-content of expiredd breath condensate on the 10th day of modeling of different variants nephropathy was increased in all cases. When toxic chronic nephropathy compared to the control series of experiments ONO2-increase in expired breath condensate was 1.3 times greater. When background diabetic nephropathy, angiopathy on this figure in expired breath condensate was 1.6 times greater in animals with a manifestation of chronic renal failure — 1.7 times greater than in intacted animals.

The dispersion of concentration-response curve showed that on 10-th and 20-th day of diabetic nephropathy the 2nd type dominant, and on 30-th day — 3-rd type, characterized by high productivity in respiratory ways and in outlet of lungs.

Key indicators of NO-system (NO, NOS) passed on the 30th day of development of diabetic nephropathy from the third group concentration curves with low productivity in exhaled breath condensate in the first (1 and 3 type of concentration curves).

Conclusion. Conducted analysis in concentration changes of blood and expired breath condensate among animals with chronic toxic nephropathy showed dominance of productivity in respiratory ways. But the tendency was saved. Such value among animals with nephropathy under diabetic angiopathy showed dominant of high level of productivity among learned exponents into expired breath condensate. On the back of opportunity reduction in influence on growing exponents in vascular system owing to angiopathy manifestation this function takes respiratory ways. This hypothesis can be morphostructural, associated with changes in lungs (in blood barrier) under diabetic angiopathy and growing azotemia.

References:

1. Bajibina E. B. additional methods in laboratory methods of kidneys' function and disease of urinal system.//Kuban veterinary. – 2006. – No 1, – C. 29–31.

2. Lavin G.Ya, Egorihina M. N. The role of lipid peroxidation in the aggregation of blood cells in burn disease//Clinical Laboratory Diagnostics. – 2008. – No 8. – C. 43–44.
3. Mitzi A. K., Brin V. B., "Method of chronic toxic nephropathy modeling". Patent holder State Educational Institution of Higher Professional Education "North-Ossetian State Medical Academy" of the Federal Agency for Healthcare and Social Development of Russia. Patent number 2358327 from 10.06.2009 y.
4. Mukhin H. A. Mikroalbuminuriya-universal marker of poor prognosis/H. A. Mukhin, V. V. Fomin, C. B. Moses//Klin.medcine. – 2008. – No 11. – P. 4–9.
5. Ohunov S. A., S. Z. Bozaripov "Method for chronic kidney disease modelling under diabetic nephropathy," the patent – No IAP 04955. PVRUz from 04.11.2011.
6. Groop P.H The presence and severity of chronic kidney disease predicts all-cause mortality in type 1 diabetes/P. H. Groop M. C., Thomas J. L., Moran et al.//Diabetes. – 2009. – Vol. 58. – P: 1651–1658.
7. Lang F. Cell volume control/F. Lang//Seldin and Giebish's the kidney/eds. R. Alpern S. C. Hebert. – Amsterdam a. o. Elsevier, – 2008. – P. 169.
8. Maeda S. Review: genetics of diabetic nephropathy//Card, dis. – 2008. – Vol. 2. – P. 633–371.
9. Moorhead J. F. Dysregulation of LDL receptor under the influence of inflammatory cytokines: A new pathway for foam cellformation/J. F. Moorhead, X. Z. Ruan et al.//Kidney Int. – 2011. – Vol. 60, – No 5. – P. 1716–1725.
10. Navarro-Gonzalez J. F., Mora-Fernandez C., De FuentesM. – M. et al. Inflammatory molecules and pathways in the pathogenesis of diabetic nephropathy//Nat. Rev. Nephrol. – 2011. – Vol. 7. – P. 327–340.

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Improvements to the selection of minimally invasive techniques in laparoscopic elimination diastasis rectal muscle of abdomen

Abstract: Objective. Assess the feasibility of laparoscopic elimination of diastasis recti and improve the results of treatment of such patients. Material and Methods. In 2 clinical TMA for the period from 2015 to 2016 performed 21 laparoscopic operations for diastasis recti II–III degree. Patients with diastase II degree was 9 (42.8%), with III — 12 (57.2%). The age of patients ranged from 36 to 62 years. 58% of patients were older than 50 years. Men were 7 women — 14 patients. In 7 patients had a concomitant pathology requires simultaneous operations: 4 — cholelithiasis, 3 — inguinal hernia. Results. Laparoscopic elimination of diastasis sheathe made under anesthesia. When laparoscopy determined the boundaries of diastasis recti. The operation was carried out with the help of endoscope developed by us, "the hook-needle" Mean operative time was 52,5 ± 5,3 m. When simultaneous operations the figure was 73,5 ± 13,7 minutes. There were no intraoperative complications. The mean time of hospital stay was 4,1 ± 1,3 bed-days. After surgery, patients have 7–8 hours back to normal pre-operative activities. The need for daily dressings, surgeon visits was not. The average number of visits to the surgeon on an outpatient basis was 5,2 ± 1,3 times. Relapse during the observation was not for 1 year. The patients had no complaints, physical activity does not cause discomfort, strain in the anterior abdominal wall was not, rectus abdominis edges abut one another. Conclusion. our first experience with laparoscopic elimination of diastasis recti showed that it is a highly effective method of treatment less traumatic and has a number of health and social benefits.

Keywords: diastasis of rectal muscle of abdomen, laparoscopic liquidation, endo-needle.

Today surgery lets discuss about the selection methods of mini-invasive interventions in different areas of the abdomen. Aging and constant physical activity leads to disruption of the anterior abdominal wall soft tissue blood circulation that stimulates the development of discrepancies musculo-fascial layer of the stomach. Thus, the rectus abdominis is one of the more yields in a given situation, the differences which called diastase. Among the strains of soft tissue of the anterior abdominal wall diastasis recti is 40%. The combination of diastasis recti with umbilical hernia reaches 60%, which is often ignored by surgeons during surgery, thus, recurrence of hernia. The recurrence rate in the late postoperative period ranging from 45 to 80% [1; 2; 3; 5].

More than 35 surgical methods of elimination and their modifications proposed for the treatment of diastasis. Despite this variety of correction methods, the question of choosing the most effective among them remains controversial [1; 4; 6]. It is well known that the traditional methods of surgical correction, such as plastic or Shampinoneru by Voznesensky to eliminate diastasis of the rectus muscles of the anterior abdominal wall to the far more often used. The frequency of relapses and the development of postoperative ventral hernias up to 11.3% [2; 4].

The introduction of new technologies in surgery allowed to perform different minimally invasive surgical procedures in the

abdominal surgery with minimal traumatization of the tissues of the anterior abdominal wall. In this regard, for further improvement of existing methods, it would be advisable to study the possibility of elimination of diastasis recti mininvazivnym method.

The aim of our study is to assess the feasibility of laparoscopic elimination of diastasis recti and improve the results of treatment of such patients.

Materials and methods.

In 2 clinical TMA for the period from 2015 to 2016 performed 21 laparoscopic operations for diastasis recti II–III degree. Patients with diastase II degree was 9 (42.8%), with III — 12 (57.2%). The age of patients ranged from 36 to 62 years. 58% of patients were older than 50 years. Men were 7 women — 14 patients. In 7 patients had a concomitant pathology requires simultaneous operations: 4 — cholelithiasis, 3 — inguinal hernia.

Given the significant risk of postoperative complications in open plastic in patients with high anesthetic risk, its implementation has been limited. In such cases it is advisable to exercise clinical liquidation diastasis of the rectus muscles of the abdomen by laparoscopy

Thus, patients with IBS have 2 (9.5%), degree of obesity 2.3–2 (9.5%), diabetes — 1 (4.7%), chronic disorders of the respiratory system — 1 (4,7%). In 4 (19%) cases of simultaneous laparoscopic cholecystectomy in 3 (14.2%) — laparoscopic hernia repair. When comorbidity abdominal diastasis liquidation made the second stage, ie After performing cholecystectomy and laparoscopic hernia repair.

Results:

Laparoscopic elimination of diastasis sheathe made under anesthesia. When laparoscopy determined the boundaries of diastasis recti. The operation was carried out with the help of endoscope developed by us, "the hook-needle".

On the right (or left) edge of the medial rectus muscles, under the control of the laparoscope, through incisions of up to 2 mm input tools "endoscopic needle — hook" into the abdominal cavity and delivered thread that was fixed in the abdominal cavity endoscopic clip inserted through the working puncture. Endoscopic needle hook taken out of the abdominal cavity.

Through an existing incision in the skin at an angle of approximately 40–60 degrees endoscopic needle hook injected into the thickness of the anterior abdominal wall towards the left (or right) edge of the medial rectus muscles and entered into the abdominal cavity. The thread is fixed in endoscopic needle-hook and exteriorized. Produces extracorporeal knot tying to tension. Tie a thread of the left inside the skin, ie, at the wound site in the subcutaneous tunnel formed (Fig. 1).

Mean operative time was 52,5 ± 5,3 m. When simultaneous operations the figure was 73,5 ± 13,7 minutes. There were no intraoperative complications.

Patients intensified by the next day after surgery. Mild discomfort in the area of operational activities was observed in 5 (23.8%) patients who went through 3–4 days after surgery. In 1 (4.7%) patients had development of seroma, neuralgic pains were observed in 6 (28.5%) patients, which resolved conservatively. Other complications were noted.

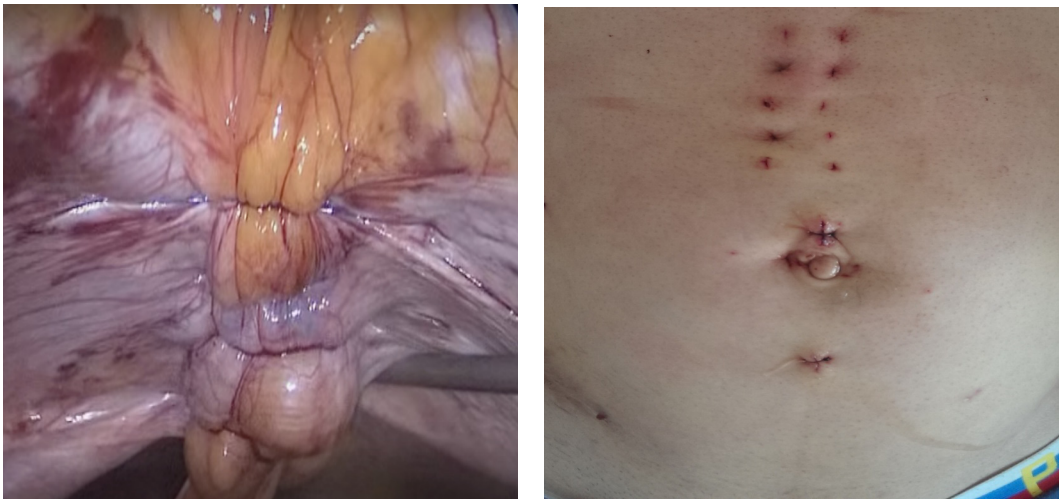

Figure 1. Intraoperative and the general appearance of the patient with laparoscopic elimination of diastasis recti

The mean time of hospital stay was 4,1 ± 1,3 bed-days. After surgery, patients have 7–8 hours back to normal pre-operative activities. The need for daily dressings, surgeon visits was not. The average number of visits to the surgeon on an outpatient basis was 5,2 ± 1,3 times. Relapse during the observation was not for 1 year. The patients had no complaints, physical activity does not cause discomfort, strain in the anterior abdominal wall was not, rectus abdominis edges abut one another.

In addition to the clinical data essential criterion for assessing the outcome of the operation is the degree of reduction of the anatomical structures of the anterior abdominal wall, in particular, the linea alba and rectus muscles return to their anatomical position, which subsequently affects the improvement in the recovery of its function.

Our clinical results show that patients with grade II and III diastasis expedient surgical treatment. At the same time, we believe that laparoscopic surgery is the elimination of the selection, which allows you to save the morphofunctional state of musculo-aponeurotic layer of the anterior abdominal wall.

Conclusion:

Thus, our first experience with laparoscopic elimination of diastasis recti showed that it is a highly effective method of treatment less traumatic and has a number of health and social benefits: cosmetic effect; maximum comfort for the patient in the postoperative period; the absence of chronic pain that arises after the traditional elimination diastasis; low probability of adhesions in the abdominal cavity; the possibility of simultaneous performing laparoscopic surgery in comorbidity when possible to perform surgery endoscopically.

References:

1. Topchiev MA The method of surgical treatment of diastasis recti.//Surgery – 2012 – No 7. – S. 49–51.

2. Korenkov M., Beckers A., Koebke J., Lefering R., Tiling T., Troidl H. Biomechanical and morphological types of the linea alba and its possible role in the pathogenesis of midline incisional hernia.//Eur. J. Surg. – 2014. – Vol. 167, – No 12. – P. 909–914.
3. Nahas F. X., Augusto S. M., Ghelfond C. Should diastasis recti be corrected?//Aesthetic. Plast. Surg. – 2014. – Vol. 21, – No 4. – P. 285–289.
4. The abdominal lineaalba an anatomoradiologic and biomechanical study/Rath A. M., Attali P., Dumas J. L. at all//Surg. Radiol. Anat. – 2013. – Vol. 18, – No 4. – P. 281–288.
5. Sanjay P., Reid T. D., Davies E. L. Retrospective comparison of mesh and sutured repair for adult umbilical hernias.//J. Hernia, – 2015, – Vol. 9, – No 3, – P. 248.
6. Spitznagle T. M., Leong F. C., Van Dillen L. R. Prevalence of diastasis recti abdominis in aurogynecological patient population.//Int. Urogynecology J. Pelvic Floor Dysfunct. – 2014. – Vol. 18, – No 3. – P. 312–318.

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Prevalence of mastopathies among women of Tashkent City

Abstract: On average, ¾ women appealing to the clinic with benign breast diseases havemastopathies which has a tendency to progress in the last five years. Out of the total incidence of women with mastopathy has a leading place in: diseases of the genitourinary system, endocrine disorders of nutritional and metabolic systems, diseases of the digestive organs, blood and blood-forming organs, respiratory organs.

Keywords: mastopathy, the overall incidence of women with mastopathy, disease structure.

Mastopathy is the most common benign breast pathology. Currently mastopathy affects about 20% of women over 20 years of age and 40% of women older than 40 years. Mastopathy often develops on the background of chronic inflammatory processes in the genital organs, dysfunction of the ovaries, thyroid disorders, functional disorders of the nervous system [1; 2; 6], so treatment and prevention efforts must begin with eliminating the causative factor.

Objective: aim of the research is to assess the prevalence of mastopathies and assessment of the overall morbidity of women suffering from mastopathy.

Research materials and methods: Negotiability of women about breast pathology and the prevalence of mastitis in the dynamics in the last five years (2011–2015 years) were studied leaning on statistical records of the city Oncology Center in Tashkent. To assess the overall morbidity of women with mastopathy analyzed the results of medical examinations made in the medical records of women. In order to identify suspected risk factors for mastitis conducted a survey of women. Taken results processed by the method of variation statistics.

Research results and discussion: Results of the study negotiability of women in the city Oncology Center about breast pathology indicate that appealing of women to oncology clinic isincreasing annually (Table 1). But here negotiability of women about benign breast pathologies does notchange in dynamics, but the appealing about mastitis, especially fibrocystic tends to rise.

We drew attention to the negotiability of women for breast cancer. This rate ranged from 3.8 to 4.8% of all those who applied to the city Oncology Center. The survey interviews of these women showed that 67.1% of them had suffered a mastopathy.

Table 1. – Appeals of women about pathologies of breast in the city oncology center (2011–2015 years)

Appealability and its reasons	Study year				
	2011	2012	2013	2014	2015
Overall appeals abc.	9190	9754	10650	11781	13191
– primary%	78,4	63,4	67,7	56,9	62,2
– iterative%	21,6	36,4	32,3	43,1	37,8
About benign diseases of breast pathologies in percentage from general number of appeals	58,6	60,2	58,0	58,0	58,4
– out of them about mastopathies%	60,6	63,9	64,8	76,4	88,0
– fibrous-cyctousma stopathies	26,8	28,0	32,4	32,5	37,9

Next, we studied casualties of mastopathy of women, depending on age. In most cases the disease (27.18%) was observed at 40–49 ages. Next place ranking occupied the age of 30–39 years (23.9%), the lowest proportion of mastitis was recorded at the age of 60 years and older (14.12%).

Therefore, mastopathy occurs more in women in the most active working age (30–49 years). In our opinion, this may be due to theirmore passive reproductive function during employment: decreasing of birthrate and limiting or even cessation of breastfeeding.

Certain regularity we also found in the study of women's diseases seasonality of mastopathy (Figure 2).

Thus, the largest number of complaints about mastitis in the studied years (2011–2015 years) were in March (45.4), April (53.2), September (41.3), October (50.0) and November (44, 0), while the average number of diseases registered during the year-39.0. Consequently, the incidence of mastopathy in women living in Tashkent has certain seasonality. Most often the disease recorded in the spring and autumn periods of the year, with the peak incidence occurs in April (53.2) and October (50.0). Certain seasons of mastopathy incidence appears to be related to climate change, a change in weather conditions, the reactivity of the body of women and their way of life in different periods of the year. Thus, planning preventive measures for primary and secondary prevention should take into account the seasonality of disease mastopathy.

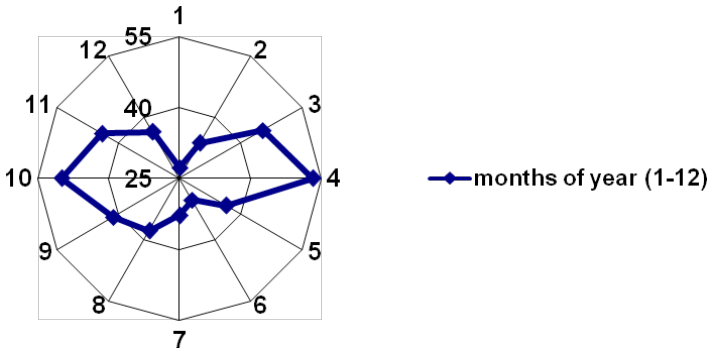

Figure 1. Seasonality of mastopathy diseases.

The increasingof incidence of breast pathology particularly mastopathy cannot not reflect on the general state of women's health, their quality of life.

The method of random sampling among women coming for the mastitis we studied their overall morbidity in dynamics for five years. The sample was 20% of the number of applicants in Oncology clinic that were representative in relation to the general population and made it possible to obtain accurate, reliable results about the overall incidence of women in classes of disease age and years in the dynamics.

The study showed that the level of overall morbidity women mastopathy was 1590,3‰. The structure and the level of general morbidity of women with mastopathy ranks first diseases of the genitourinary system (17.4% and 276,4‰), the second — Endocrine, nutritional and metabolic diseases (13.8% and 219.4‰), third — diseases of the digestive system (10.7% i169,7‰), the fourth disease of blood and blood-forming organs (10.2% and 162.4‰), the fifth largest of the respiratory system (7.5% and 118.8‰) (Figure 2). On the listed 5 classes accounted for 59.6% of all diseases of women with mastopathy.

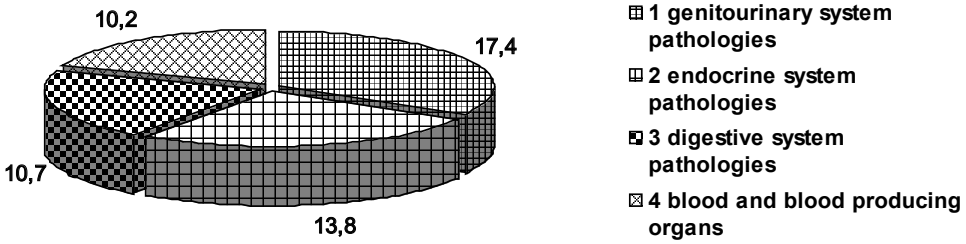

Figure 3. Structure of the total incidence of women suffering from mastopathy,% of the total

Our study once again confirmed that the mastopathy is pluricausal disease, the development of which contributedby adverse environmental factors, unhealthy lifestyle, the presence of chronic inflammatory processes in the pelvis and genitals diseases [3].

The level of general morbidity of women with mastopathy, studied for years tended to increase (Figure 4). In 2011 the overall incidence of women with mastopathy, amounted to 1327.3 cases in 2015 increased to 1806.1 cases per 1000 women that over the last five years the total incidence of women with mastopathy increased by 47.88 cases per 1000 women (P<0.01).

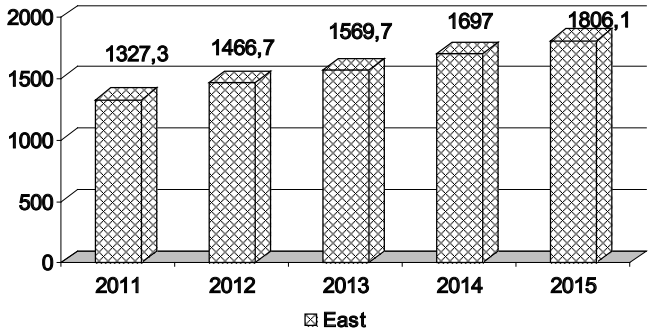

Figure 3. The level of the overall incidence of women suffering from mastopathy

Moreover, an increase in the overall incidence of diseases associated with an increase of pathology in urinary organs (218,2 and 333,3‰), endocrine system (175,8 and 272,7‰), the blood and blood-forming organs (133,3 and 169,7‰), organs of digestion (151.5 and 175.8‰) and other classes of disease (Table. 2).

The study of general morbidity of women, depending on age also shows an increase in its level with increasing of age. The lowest overall incidence is set at the age of 20–29 years (1381,3‰), and the highest in the age of 40–49 years (1612,0‰). The increase of the overall incidence of women with mastopathy was mainly due to the increase of diseases of the genitourinary system (231.3 and 41,7‰). The peak incidence of infectious and parasitic diseases, neoplasms, diseases of the nervous system, ear and mastoid process, respiratory, urogenital system between the ages of 60 years and older. The highest incidence of diseases of the blood and blood-forming organs, the endocrine system, the eye and its adnexa, digestive system is installed in aged 50–59 years, and the highest level of mental illness was registered in the age of 40–49 years.

A special place among negative factors responsible for the occurrence of mastitis is thyroid dysfunction; the presence of nodes in the thyroid, goiter, and hypothyroidism is obvious or hidden. In addition, the mastopathy may develop in dysfunction of the liver. This disease is also common for women with a history are suffered from cholecystitis or hepatitis [4; 5].

Thus, detailed study of themastopathypathology of and overall morbidity of women with mastopathy, led to the following conclusions:

1. Morbidity of mastopathy has distinctive seasonality. Mostly mastopathy is registered in the spring and autumn seasons. The highest rate of appealing is in the April and October months. Seasonality should be considered while scheduling the treatment and prevention.

2. The level of general morbidity of women with mastopathies is averagely 1590,3 from 1000 cases of women. The lowest level of the general morbidity of women is established in 20–29 years of age (1381.3‰), the highest level in 60 and older years of age, 1916,7‰ ($p< 0,01$).

3. Out of the total incidence of women with mastopathy has a leading place in: diseases of the genitourinary system, endocrine disorders of nutritional and metabolic systems, diseases of the digestive organs, blood and blood-forming organs, respiratory system organs. Five classes of diseases listed above, 60% of is related to the mastopathy.

4. It is really important to pay attention to the prevention of inflammatory diseases of pelvic organs, gynecological diseases, pathologies of thyroid gland, and diseases of digestive system and formation of healthy life style clues.

References:

1. Andreeva Y. N. Main aspects of the etiology and pathogenesis of fibrotic-cystous pathologies of the breast//Obstetrics and gynecology news. – 2008. – No 6. – P. 7–10.
2. Letyagin V. P. Mastopathy//Russia.med. magazine. – 2010. – Vol. 8, – No 11. – P. 28–34.
3. Lee L. A. Contemplation of the Oncologist about the meaning and content of medicinal treatment of mastopathy//Oncology. – 2006. – No 4. – P. 35–38.
4. Makarenko N. P. Mastopathy//Med. Magazine – 2003. – No 7. – P. 10.
5. Mezinova N. N. Breast and hormones. – Almaty. – 2008.
6. Mirrahimova D. T. Mastopathy//Medical magazine of Uzbekistan – 2007. – No 5. – C. 73–76.

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Use of citicoline for the complex therapy of patients suffering from the primary open-angle glaucoma

Abstract: Article presents the results of the study the neuroprotective influence of Ronocit drug on the patients with POAG having normalized IOP basing on the clinic and functional data of the visual organ. Analysis of the obtained results indicated to high enough clinic efficiency of Ronocit (Citicoline) drug for the conservative treatment of patients with POAG and compensated IOP. This drug might be recommended as the background neuroprotective therapy.

Keywords: glaucoma, primary open — angle glaucoma, interoccular pressure, neuroprotective treatment.

Actuality. Every year one person of every 1000 ones of the 40–45 years old groups falls ill. Currently about 60–70 millions of patients of the world suffer from glaucoma and every ten one of them have already become blind. Depending on the stage of the glaucomatosis a part of nerve fibres of the optic nerve undergoes atrophy and the other part of them is at the parabioses state. It allows to hope that restoration of their functions is possible by the therapeutic or surgical methods of treatment [2; 6].

The essence of the neuroprotective treatment is to prevent the cascade of reactions defecting the neurons, mainly being the result of the ischemia development. It should be pointed out that it concerns namely, the consequently developed reactions in which new and new neurons are involved in the pathologic process unless the defected tissue surrounding them becomes the source of the pathologic processes. That is why the neuroprotective treatment should be carried out within the limits of the so-called therapeutic frame (window) before the effected nerve tissue has not become irreversible [1; 4; 5].

The aim of our research work was to study the neuroprotective influence of Ronocit drug on the patients with POAG having

normalized IOP basing on the clinic and functional data of the visual organ.

Material and methods: Sixty patients (38 women and 22 men), their average age was 60,75 ± 12,83 with the diagnosed open-angle glaucoma at I, II, III stages. The disease duration was from 6 months to 10 years, in average 3,1 ± 0,6 years. The examined patients included in this group were the patients whose IOP was achieved either by drug therapy or surgery and did not undergo neuroprotectoric treatment during the last six-months period.

All the patients were divided in two groups — basic and control ones. Both groups of patients were representative by their basic clinical indications. The control group included 28 patients (47 eyes) who were given the routine traditional therapy: 1% solution of Emoxypine in 1,0 ml dose parabulbarly; 10% solution of Pyracetam 5,0 ml dose intravenously; 1% solution of Riboflavine mononucleotide in 1,0 ml dose, 5% solution of Pyridoxine hydrochloride in 1,0 ml dose, 5% solution of Ascorbic acid in 2,0 ml dose intramuscular injection for 10 days; One pill of Cavinton 3 times a day, Aevit one pill three times a day during one months.

The basic group included 32 patients (52 eyes) and were treated by the traditional therapy and Ronocit (Rotopharm, Great Britain) injected intravenously in the isotonic solution in 1000 mg/day dose for 10 days.

All the patients were examined by: visometria with the optimal correction, biomicroscopia, computer perimetria on the Humphrey field analyser (HFA II 740), gonioscopia, tonographia, eye- botton examination with Volk lens, optic cocherred tomography (OCT), defined the threshold of the optic nerve electric sensitivity and lability by phosphene, controlled the patients adherence to the treatment.

There were specified side effects, keeping to the instillation regime, change in the patientis self-appraisal of his (her) mood and state.

The clinical efficiency of the treatment have been estimated by: visual acuity (V.A), mean deviation of the retinal photosensitivity in the central zone, threshold of the phosphene electric sensitivity (ThPhES) critical frequency of phosphene fusion flickers (CFPh F.F) at the "3,0" regime.

Results and Discussion: Good local and systemic endurability to Ronocit was observed at every stage in the course of treatment.

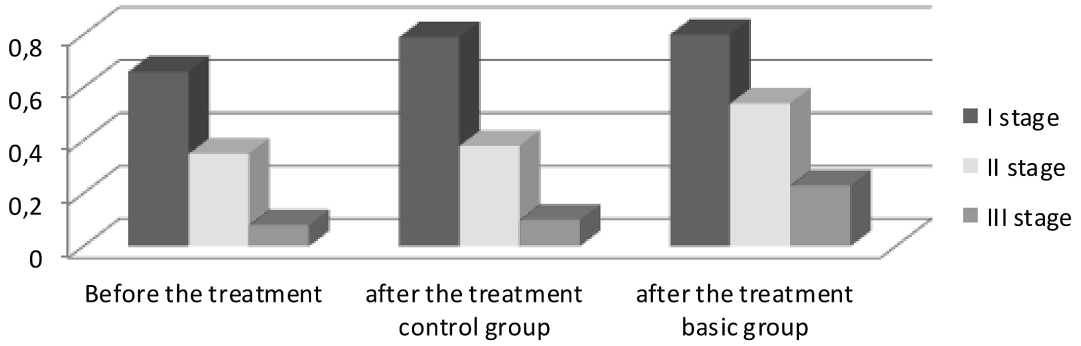

Figure1. The visual acuity dynamics before and after the treatment

Note: p – reliability of various indices if compared to that before the treatment at the same stage of POAG.

It is demonstrated on fig.1 that V.A of patients of the basic group has reliably improved after the therapy and was 0,80 ± 0,02 at the first stage of the disease; 0,54 ±0.02 at the second stage and 0,23 at the third stage. The V.A of patients in the control group was: 0,79 ±,02 at the first stage; 0,38 ±0,02 at the second stage and 0,10 ±0,02 at the third stage. There was noted some improvement of the eye-vision in this group but the indices are not reliable (p > 0,05).

Thus, treatment of the patients with POAG by the drugs according to the scheme elaborated by us, the V.A has reliably improved to 0,08 ± 0,2, that is four times higher than that after the traditional therapy. This is, by our opinion, the result of correct selection of the drugs combinations, taking into consideration the continuity of the therapeutic effect and their synergism. It is known that V.A at POAG is not the objective indicator for GON but nevertheless it influences essentially on the patient's life quality.

The functions of the inner layers of the retina and the axial band of the optic nerve have been estimated by the method used for definition the ThPhES and electric lability by phosphene (CFPhFF) in the examined patients suffering from POAG.

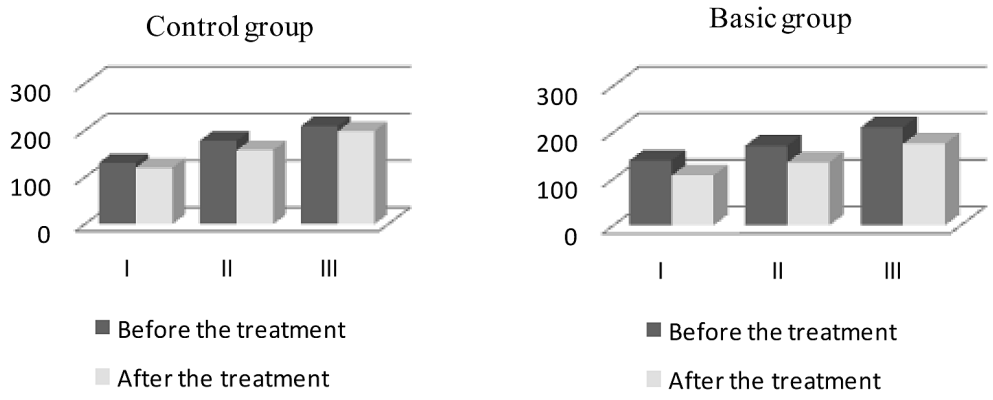

Figure 2. Change in the Threshold of electric sensitivity by Phosphene

Note: p – reliability of various indices if compared to that before its treatment at the same stage of POAG.

It is demonstrated in the fig.2, that in the basic group of patients with the first stage of POAG the threshold of electric sensitivity to phosphene was 138,8 ± 9,3 μkA before the therapy, after the treatment the index became reliably lower (p < 0,001) (by 22,7%) and was 107,3 ±6,4 μkA if compared to that of prior the treatment at the same stage of the disease designated as 100%; at the second stage of POAG the index was 170,8 ± 13,0 μkA before the therapy and after the therapy it has reliably (p < 0,001) decreased (by 20,7%) to 135,4 ± 10,9 μkA if compared to the indices before the treatment at the same stage of the disease designated as 100%. At the third stage of POAG the index before the therapy was 210,7 ± 17,2 μkA and after the treatment it has become reliably lower (p < 0,001) (by 17%) to 175,6 ± 12,8 μkA if compared to that of prior the treatment at the same stage of the disease designated as 100%.

In the control group at the first stage of POAG the ThPhES index was 130,0 ± 7,0 μkA before the treatment and after the treatment it has reliably (p < 0,001) decreased (by 7,6%) if compared to the indices before the treatment indicated as 100% and was 120,1 ± 6,5 μkA; at the second stage of POAG before the therapy index was 177,4 ± 11,3 μkA and after the treatment it has become insignificantly lower (p < 0,05) to 157.9 ± 11,6 μkA, by 10,9% lower if compared to that designated as 100%; at the third stage of POAG the index was 208,7 ± 16,5 μkA before the treatment and after that it has become significantly lower (p < 0,05) to 198,5 ± 16,8 μkA, by 4,9% less if compared to the indices before the treatment at the same stage of the disease.

It was revealed that if the first drug recommended to the patient were droplets of the Prostaglandine analogues group the ThPhES index was usually less than that in the other groups. This is obviously the result of achievement the target pressure more quickly and retaining the electric sensitivity of nerve fibres and also the neuroprotective effect of the drug itself. The ThPhES higher efficiency we have noted also in patients of the basic group with less period of the POAG desease duration who was given the combined therapy during course of complex treatment. The results of investigation of the C Ph FFF indices of the examined patients with POAG are presented in fig.3.

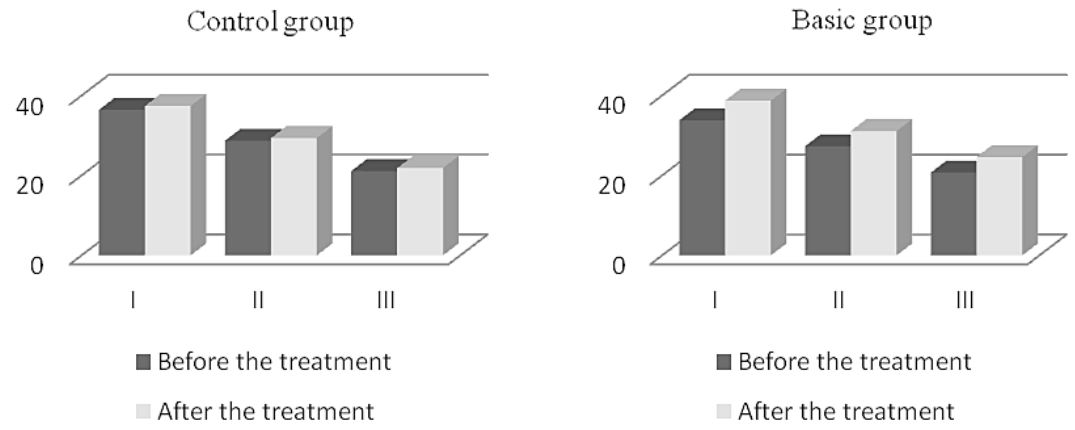

Figure 3. Changes in the CPhFFF in patients with POAG

Note: p — reliability of the index differences when compared to that before the treatment at the same stage of POAG.

Fig.3 demonstrates the reliable growth of the CPh FFF indices by 14,5% in average (before the treatment — 33,8 ± 1.5; after the treatment — 38,70 ± 0,87) at the first stage and by 13,9% at the second stage (before the treatment — 27,30 ± 0,76; after the treatment — 31,1 ± 0,5) while in the control group it was by 2,7 and 2,4% respectively if compared to the indices before the treatment at the same stage of the disease, indicated as 100%. It is reliably lower than in the patients of the first group, treated by the recommended by us therapy. This indicates the reliably higher activisation of the retinal ganglions cell and their axons in the patients of the basic group.

Thus, use of the Ronocine in the complex therapy for the patients with POAG helps to activate to a greater degree the visual analyzer.

The results of investigation of the threshold sensitivity of the retina (dB) according to the data obtained by the computer statistic Humphrey perimetria are given in fig.4.

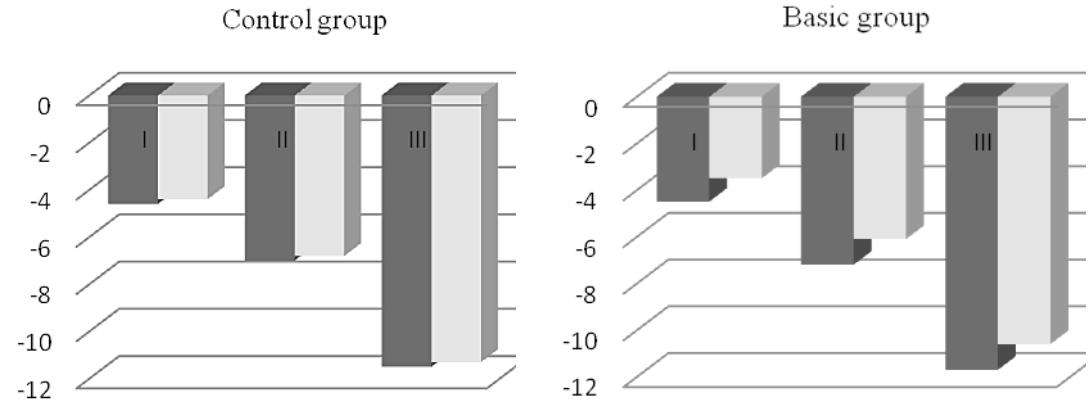

Figure 4. Change of the retinal threshold sensitivity obtained by the computer statistic Humphrey perimetria

Note: p — reliability of the indices distinction in comparison with its value prior the therapy at the same stage in POAG.

Fig.4 demonstrates that in patients with POAG at the first stage the threshold of retinal sensitivity was 4,50 ± 0,08 dB before the treatment, after the treatment the index increased reliably ($p < 0,001$) by 22,2% and was 3,50 ± 0,07 dB; at the stage II the POAG index before the treatment was 7,20 ± 0,08 dB, after the therapy the index increased ($p < 0,001$) by 15.3% and was to 6,10 ± 0,09 dB if compared to that before the treatment at the same stage of the disease indicated as 100%; at the third stage the POAG index prior the therapy was 11,7 ± 0,09 dB and after the treatment increased ($p < 0,001$) (by 9,4%) to 10,6 ± 0,08 dB if compared to the index before the treatment at the same stage of the disease.

In the second group (fig.4) at the first stage of POAG the threshold of the retinal sensitivity was 4,6 ± 0,1 dB before the treatment and after the treatment the index ($p < 0,05$) increased (by 4,3%) and was 4,40 ± 0,09 dB; at the second stage of POAG the index before the treatment was 7,00 ± 0,13 dB and after the therapy it increased ($p > 0,05$) to 6,8 ± 1,4 dB being by 2,9% higher if compared to the index before the treatment at the same stage of the disease taken for 100%; at the third stage of POAG the index before the therapy was 11,5 ± 0,13 dB, and after the treatment it elevated ($p > 0,05$) to 11,3 ± 0,08 dB which was by 1,7% higher if compared to the data before the treatment at the same stage.

According to the data obtained by computer statistic Humphrey perimetria, there was increase in the photosensitivity of retina, decrease in quantity, size and depth of the scotoma, widening the area with normal photosensitivity in patients of the basic group (fig.5).

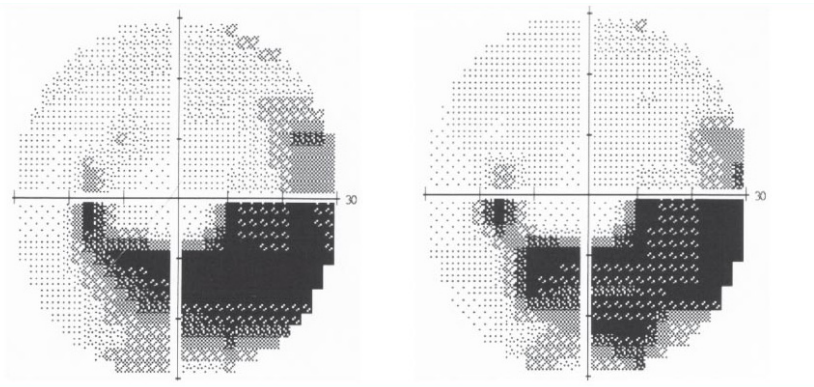

Figure 5. Humphrey perimetria of the left eye of the patients with second stage of POAG before and after the treatment

Thus, Ronocit (Citicoline) induces marked neuroprotective effect at POAG, rendering the effective protection of the nerve tissue and slow down the apoptosis. Besides the improvement of the clinic and functional indices of the visual organ we have observed the improvement of the general feeling, attention and working ability in all the patients.

Conclusion:

1. Analysis of the obtained results indicated to high enough clinic efficiency of Ronocit (Citicoline) drug for the conservative treatment of patients with POAG and compensated IOP.

2. This drug might be recommended as the background neuroprotective therapy.

References:

1. Kurishova N. I. The role of the methods of visualization of the optic nerve disc and the nerve fibres layer of retina at the earlier diagnostics of glaucoma. Glaucoma, – 2007, – 1; 16–22 p.
2. Kurishova N. I. Glaucoma optic neuropathia. – Moscow, Med Press Inform, – 2006, – P. 315.
3. Kuroyedov A. V., Gorodnichiy V. V. Computer retinotomography (HRT): diagnostics, dynamy and reliability. – Moscow, – 2007, – 126 p.
4. Shkarlova S. I. Glaucoma and catarracta. Seria "Medicina dlya vas" Rostov on Don; Fenix; – 2001; – 192 p.
5. Nesterov A. P. Glaucoma. – Moscow; MIA; – 2008, – 357 p.

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Risk factors of the development of arterial hypertension in children in Uzbekistan regions

Abstract: The article was dedicated to the study of children performed according to multi stage program, in the process of which it was determined, that the most significant risk factors of arterial hypertension in children and adolescents in the Republic of Uzbekistan were sedentary style of life, irrational nutrition, and heredity.

Arterial hypertension (AH) is one of the most important risk factors of cardiovascular pathology development and it is one of the leading reasons of lethal outcomes in the world [1; 2]. In the modern time it is doubtless, that origin of AH is in childhood and adolescence, when neurogenic and humoral mechanisms of cardiovascular system regulation are formed [5].

According to some authors the prevalence of AH among children and adolescents varies from 2.4 to 18% [3], and according to the results of other researchers from 0.76% to 33% [4].

Formation of AH in children and adolescent, as well as in adults, effects a series of factors, including height [6], body mass at birth, original emotional tone, constitutional-typical and personal characteristics, high level of anxiety and emotional tension, significantly related to hypertensive reactions [4].

Nowadays revealing of risk factors becomes a common strategy of cardiac-vascular pathology prevention. Categories of risk factors of cardiovascular diseases include psycho-social (stress factors, low education level, depression), traditional (AH, smocking, obesity, dyslipidemia) factors and biochemical markers [5]. These are so-called modified factors. Non-modified factors include age, gender, and genetic predisposition. Majority of teenagers have combination of factors, which significantly exceeds the risk of cardiovascular disease development [1; 2]. At the same time most of RF (unfavorable psycho-emotional background in family, hypodynamics, irrational nutrition, overweight, unstable arterial pressure) are modified [5].

Keywords: arterial hypertension, children, risk factors.

The objective: to characterize physical development of children and teenagers with arterial hypertension in the Republic of Uzbekistan.

Materials and methods of the research. Examination of the children was performed in compliance with multi stage program. For the research we chose educational facilities. The first epidemiological stage was aimed to study the prevalence of arterial pressure increase and risk factors of cardiovascular disease occurrence among children and adolescents of the Republic of Uzbekistan. At that stage of the study we enrolled 1226 children in the age from 11 to 17 years old by means of non-selecting overall method for the assessment of arterial pressure, definition of antropometric values of physical development, reveal of genealogical and social peculiarities in the history. At the first stage of the study we performed a polling of 718 girls and 508 boys in compliance with the objective and the problems.

In 363 (29.6%) children increase of arterial pressure (AP) was fixed just once. That provided relative inclusion of these children to the group of children and adolescents with "White coat hypertension" (WCH) phenomenon. Later medical staff of the educational facility was recommended to follow the children of that group with measurement of AP in school not less than once a month. At the second (outpatient) stage we examined 254 teenagers at the age 12–17 years old, among them 126 boys and 128 girls, who had increased values of arterial pressure in every triple screening assessment with 10–14 days interval.

According to the results of the study we created two clinical-functional groups for monitoring dependently on the type of hypertension: 139 (12.9%) children and adolescents with labile arterial hypertension (LAH) and 115 (10.7%) children and adolescents with stable arterial hypertension. All examined children had registered high values of AP for corresponding gender, height, and age within three doctoral check ups with 10–14 days interval. At the moment of checking the patients did not receive antihypertensive agents.

Statistical processing of the results was performed with the help of computer software Microsoft Excel with calculation of reliability with Student's t-criterion.

Results and discussion. The data of the polling revealed absence of following the day routine and healthy style of life by majority of children. The most significant deviation of the day routine was hypodynamics, little physical activity. Hypodynamics (regular physical activity only during the classes of physical training in school) was noted in 63.2% boys and 86.5% girls. Only 22.3% boys and 7.0% had regular participation in sport activities.

In the age aspect the number of children and adolescents spending not less than 2–3 hours per day outdoor and playing mobile games decreases with age, and more significantly among girls. If in 12 years old age regular and long-lasting walking and games outdoor were registered in 77.9% boys and 70.8% girls, to 17 years old age that number diminished to 68.9% and 55.8% respectively ($p<0.05$). Significant part of spare time children and adolescents in all age groups spend in front of computer and watching TV programs.

Stereotypes of irrational nutrition, not corresponding to the principles of healthy style of life, were revealed in 56.1% boys and 50.1% girls. The most often registered deviations of routine were absence of competent breakfast, having meal on request, and late dinner. The quality of pupils' nutrition differed by its incompetence and imbalance. Majority of children and adolescents (88.0% boys and 75.9% girls) have regular living on snacks and everyday drinking sparkling water ($p<0.05$). Only 61.9% boys and 71.0% girls have meat, milk and diary products, vegetables, and fruits in their everyday ration.

Analysis of the incidence of unfavorable anamnesis factors according to polling revealed several characteristic features dependent on the type of arterial hypertension, age, and gender.

In the age interval 12–14 years old time spent on computer and TV programs more than 3 hours per a day in the group of boys with SAH was observed reliably more often in comparison with the patients with normal AP ($p<0.05$). Among girls spending more than 3 hours per day on computer and TV programs was observed reliably more often in the group with LAH ($p<0.05$) in comparison with the children without AH. In the group of adolescents of 15–17 years old the incidence of spending more than 3 hours per a day on computer and TV programs did not significantly differ both among boys ($p>0.05$), and among girls ($p>0.05$) in all compared groups. Among the boys stereotypes of irrational nutrition were reliably more often among the children and adolescents in the group with normal AP ($p<0.05$) and SAH ($p<0.05$), while among the girls in the group with LAH ($p<0.05$).

Complicated heredity with not less than 3 pathologies was registered in case of presence of the 1st (siblings, parents) and 2nd (aunts, uncles, grandparents) relationship degree. Cardiovascular diseases, which were taken into account, were hypertonic disease, myocardial infarction, and angina appeared before 55 years old. Besides that, risk factors of AH included lipid exchange disorders in family history, renal pathologies, and obesity.

Complicated heredity was not immediate correcting risk factor, but its presence testified a greater degree of occurrence of AP increase in children and teenagers, and that provided formation of risk groups according to development of AH and prevention of AP increase via effecting correcting factors of environment.

Results of the analysis of heredity testified reliably greater burden among the examined children with SAH in comparison with LAH in hypertonic disease 57.0% versus 14.4%, $p<0.01$.

We did not reveal reliable differences in the burden of cardiovascular diseases between the groups with LAH and SAH (myocardial infarction, angina) and renal diseases ($p>0.05$).

Complicated heredity with disorders of lipid exchange was reliably more significant in the group with SAH (82.5% versus 30.7%, p<0.01). Similar results in the group with SAH were obtained in relation to obesity (78.1%).

Disorders of lipid exchange and obesity were more significant in the group with SAH compared with LAH (82.5%).

Thus, the most significant risk factors of arterial hypertension in children and adolescents were hypodynamics, irrational nutrition, and complicated heredity.

References:

1. Bunina Y. Risk factors of the development of primary arterial hypertension in children and adolescents/Y. Bunina, N. Minilova, U. Rovda//Doctor: Monthly scientific-practical journal. – 2010. – No 1. – P. 40–43 (in Russian).
2. Importance of risk factors of the development of arterial hypertension in children and adolescents/I. S. Kozlova//Collection of the materials of XVI Congress of pediatricians of Russia "Topical problems in pediatrics". – M., – 2009. – P. 188.
3. Markers of metabolic syndrome in teenagers with arterial hypertension/I. V. Plotnikova//Pediatrics. – 2007. – V. 86. – No 3. – P. 39–43.
4. Compulsory conditions for the prevention of cardiovascular and other non-infectious diseases in Russian Federation/R. G. Organov [et al]//Cardiovascular therapy and prophylaxis. – 2010. – No 6. – P. 4–9.
5. Correlation of anthropometric indices and cardiovascular disease risk factors: Caspian Study./R. Kelishadi [et al.] Int J Cardiol – 2006. – 71 (4):437–442.
6. The metabolic syndrome in children and adolescents/P. Zimmet, G. Alberti, F. Kaufman [et al.]//Lancet. – 2007. – No 369 (9579). – P. 2059–2061.

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Clinical efficacy of percutaneous coronary intervention in patients with coronary artery disease with low left ventricular ejection fraction in the long term

Abstract

Aims: to study the clinical and hemodynamic efficacy of percutaneous coronary intervention in patients with coronary artery disease with a low left ventricular ejection fraction in the near and long-term follow-up.

Methods and results: In a prospective observation we studied analysis of the life and dynamics parameters of intracardiac hemodynamics in 65 (47.1%) patients with low left ventricular ejection fraction (less than 45%). In our study, the incidence of angiographic success with stent implantation in patients with coronary artery disease with a low left ventricular ejection fraction was 92.3% (60), the immediate success of the procedure was 85.7% (59), and the clinical success of in-hospital — 85.7% (59). The survival rate in the long term without the development of large cardiac complications was 83.1% (54). The incidence of MACE was 16.9% (11). The LVEF increasing was observed in 60% (39) patients, decreasing of the LVEF in 15.4% (10) patients and in 10.8% (7) patients it was not changed. In patients with a positive growth in LVEF after PCI in the long-term observation reversibility of LV remodeling processes were registered.

Conclusion: Percutaneous coronary intervention in patients with coronary heart disease with decreased myocardial contractility improves left ventricular ejection fraction, thereby contributing to improved quality of life. In the long period, there was significant increasing in the average left ventricular ejection fraction up to 43,5% ± 6.9% and initial index was 38.5 ± 4.9% (p = 0.000).

Keywords: Percutaneous coronary intervention; left ventricular ejection fraction; stent; major adverse cardiovascular events**.**

Introduction

Severe left ventricular dysfunction in patients with coronary artery disease is a predictor of poor prognosis. A significant portion of patients with coronary artery disease has dramatically decreased myocardial contractility, resulting in progress of chronic heart failure [1]. The prognosis for patients with chronic heart failure (CHF) is extremely unfavorable: according to the Rotterdam study 5-year survival in CHF is only 35% [2], and according to the Framingham study, within 6 years after the onset of clinical symptoms inadequate circulation die about 80% of men and 65% of women [3].

The mortality of ischemic etiology of inadequate blood circulation 1.4–3.8 times higher than in patients with hypertrophic genesis, dilatational and others [4; 5].

Coronary heart disease (CHD) patients with low left ventricular ejection fraction (LVEF) are the most prognostically unfavorable contingent of cardiac patients during myocardial revascularization operations due to the high risk of arrhythmias, congestive heart failure associated with surgery myocardial injury [6; 7].

Conservative treatment of these patients is usually not sufficiently effective, and mortality in patients belonging to the III–IV functional classes is about 50% per year [8; 9]

Adequate revascularization improves contractile function of the myocardium due to ischemia [9]. Today, according to various studies, clear evidence of the effectiveness and safety of coronary artery bypass grafting (CABG) in patients with CHD and low LVEF is obtained [10; 11; 12].

However, the oscillation frequency of hospital mortality from 2.5% to 11% during CABG, presence of contraindications or high risk for its implementation, make the choice of the optimal method for the treatment of patients with coronary artery disease with low LVEF, one of the problems for practical cardiology and cardiac surgery [12]. In this connection, a special scientific and practical interest is the study of the immediate and long-term results of percutaneous coronary interventions (PCI) in these patients.

Objective: to study the clinical and hemodynamic efficacy of PCI in patients with CHD with a low LVEF in the immediate and long-term follow-up.

Methods.

For the period from 1 January 2013 to 1 December 2014 in the department of endovascular surgery of our clinic PCI were performed in 1266 patients with various forms of CHD. In CHD patients with low left ventricular ejection fraction PCI were performed in 11.9% (138) patients. PCI was performed without detection of myocardial viability, indications for intervention were: the presence of angina, dyspnoea, hemodynamic instability, signs of myocardial ischemia, according to non-invasive methods, provided that, in accordance with coronary angiography data, these patients had coronary artery stenosis ≥ 50%. Angiographic success was defined as successful delivery and deployment of the stent or bioresorbable vascular scaffolds with achievement of ≤20% final residual stenosis. Procedure success was defined as angiographic success and no major periprocedural complications (dissection of the coronary artery damaging vessel flow — TIMI flow 2 or less, perforation of the coronary artery, emergent coronary artery bypass grafting). Major Adverse Cardiovascular Event (MACE) included death, acute myocardial infarction and coronary artery bypass surgery which took place during the period of observation. Left ventricular ejection fraction was determined by echocardiographic method Teicholz and was performed on Philips ClearVue 350 ultrasound machines, by using 3.5 MHz transthoracic transducer. In a prospective observation we studied analysis of the life and dynamics parameters of intracardiac hemodynamics in 65 (47.1%) patients with low LVEF (less than 45%). Informed consent was obtained from all patients before participation in the study, and the protocol was approved by the Human Investigation Committee of our institution.

The characteristics of patients with coronary heart disease with low ejection fraction in whom coronary angiography was performed, followed by stenting of coronary arteries are shown in table number 1.

Table 1. – The clinical characteristics of patients

Variable	All patients n (65)	
Male/female n (%)	52 (80)/13 (20)	
Mean age (years)	59.5± 8.4	
Dyslipidaemia *n (%)*	59	90.7
Hypertension *n (%)*	57	87.7
Diabetes *n (%)*	26	40.0
CABG or PCI in history (up to 1 year) *n (%)*	2	3.1
Previous MI *n (%)*	45	69.2
Angina pectoris FC II (CCS) *n (%)*	1	1.5
Angina pectoris FC III (CCS) *n (%)*	23	35.4
Angina pectoris FC IV (CCS) *n (%)*	2	3.1
Unstable angina *n (%)*	10	15.4
Acute myocardial infarction *n (%)*	29	44.6
LVEF (average)%	38.5±4.9	
the average end-diastolic diameter (mm)	64.3±7.9	
the average end-systolic diameter (mm)	50,4±7.9	
the average end-diastolic volume (ml)	209.9±59.2	
the average end-systolic volume (ml)	129±44	

CABG, coronary artery bypass grafting; PCI, percutaneous coronary intervention; MI, myocardial infarction; FC, functional class; CCS, Canadian Cardiovascular Society; LVEF, left ventricular ejection fraction.

During the diagnostic coronary angiography in 65 patients with CHD and low LVEF, atherosclerotic lesions were found in 163 arteries, which averaged 2.5 per artery in 1 patient. According to selective coronarography, three-vessel coronary lesions were present in 47.7% (31) patients, two-vessel disease in 29.2% (19) and single vessel disease in 23.1% (15) patients.

The most common lesions were located in the left anterior descending artery (LAD) — 57 (34.9%); in the right coronary artery (RCA) — 38 (23.3%); in the circumflex artery — 33 (20.3%); obtuse marginal branch of the circumflex artery — 10 (6.2%); in posterior interventricular branch — 9 (5.6%); in the diagonal branch — 8 (4.9%); in the postero-lateral branches — 3 (1.8%) and intermediate artery — 2 (1.2%). Hemodynamically significant (≥50%) stem lesion of the left coronary artery (LCA) was found in 3 (1.8%) cases.

According to the results of coronary angiography, 192 hemodynamically significant stenoses of the coronary arteries were found. The results of morphometric analysis of hemodynamically significant stenoses (stenosis ≥ 50%) of the main epicardial arteries in CHD patients with low LVEF are shown in table number 2.

Table 2. – Morphological characteristics of coronary artery stenosis

Type stenosis by classification ACC/AHA	Stenosis	Occlusive lesions	Total
Type «A» *n (%)*	12 (6.2)	0	12 (6.2)
Type «B» *n (%)*	88 (45.8)	8 (4.2)	96 (50.0)
Type «C» *n (%)*	47 (24.5)	37 (19.3)	84 (43.8)
Total	147 (76.5)	45 (23.5)	192 (100)

ACC, American College Cardiology; AHA, American Heart Association.

In conducting the quantitative analysis of coronary artery stenosis in patients with coronary artery disease with low LVEF atherosclerotic lesions of varying severity were revealed. The results of our quantitative analysis of coronary artery stenosis in patients with coronary artery disease with low LVEF, are presented in table number 3.

Table 3. – The results of the quantitative analysis of the coronary arteries in patients with coronary artery disease with a low LVEF

The extent of the vessel constriction	n	%
Total occlusion	39	20.3
Functional occlusion	6	3.1
Stenosis of 75–99%	85	44.3
Stenosis from 50 up to 74%	62	32.3
TOTAL:	192	100

Statistical analysis

Statistical analysis of the results was carried out by calculating the arithmetic mean (M), root mean square (standard) deviation (SD), standard error of the arithmetic mean (m). The significance of differences was determined according to Student's t test. To analyze the significance of differences between the quality indicators it was used $\chi 2$ test. Differences were considered statistically significant at $p < 0.05$. Data are presented as M ± m.

Results

Totally 77 endovascular procedures were performed in 65 patients: in 53 (81.5%) patients was performed in a single step, in 12 (18.5%) in two steps. While deciding on the matter of intervention dividing into two phases we focused on the total time of the intervention, fluoroscopy time, the amount of contrast agent, the general course of angioplasty (successful recanalization, the presence or absence of complications, the general condition of the patient). In 100% (77) cases PCI were performed by access via radialis.

During 77 endovascular procedures the intervention was undertaken in 94 coronary artery segments totally. Direct coronary stenting was performed in 20 (21.3%) segments, transluminal balloon angioplasty (TBA) and stenting in 54 (57.4%); recanalization, TBA and stenting was performed in 14 (14.9%); recanalization attempt was made in 5 (5.3%) segments, and 1 (1.1%) segment was limited to holding TBA.

In a total number of 115 implanted stents (in average 1.8 stents per patient), 80% (92) were drug-eluting stents (BioMatrix Biosensors Inc, Newport Beach, Calif; XIENCE V Abbot Vascular, Temecula, USA; Resolute integrity Medtronic, Inc., Minneapolis, USA); 15.6% (18) bare metal stents (Coflexus, Balton, Warszawa, Poland) and 4.6% (5), bioresorbable vascular scaffolds (Absorb, Abbot Vascular, Temecula, USA).

In our study, the incidence of angiographic success with stent implantation in patients with coronary artery disease with a low left ventricular ejection fraction was 92.3% (60), the immediate success of the procedure was 85.7% (59), and the clinical success of in-hospital — 85.7% (59). The frequency of complications was 12.3% (8) of the cases; of them developed coronary artery dissection in 5 cases; in 2 cases developed one «no-reflow» phenomenon and there was bleeding from the gastrointestinal tract. The incidence of acute myocardial infarction (AMI) and death at an immediate time was 0.

The survival rate in the long term without the development of large cardiac complications was 83.1% (54). The incidence of MACE was 16.9% (11), of which 12.3% (8) developed a lethal outcome, in 3.1% (2) — non-fatal myocardial infarction and in 1.5% (1) case the coronary artery bypass surgery operation was executed. Lethal outcome occurred in 8 (12.3%) patients: in 7 cases as a result of sudden death and in one due to complications development after prostatectomy surgery. The LVEF increasing was observed in 60% (39) patients, decreasing of the LVEF in 15.4% (10) patients and in 10.8% (7) patients, it was not changed. In patients with a growth in LVEF after PCI in the long-term observation reversibility of left ventricular remodeling processes were registered.

Hemodynamic parameters of left ventricular defined by echocardiography before and after percutaneous coronary intervention in patients with growth of LVEF are presented in table number 4.

Table 4. – Hemodynamic parameters of left ventricular defined by echocardiography before and after percutaneous coronary intervention

Parameters	Before PCI	After PCI	P-value
the average end-systolic dimension (ESD) mm	52.4±7.7	47.6±6.7	0.004
the average end-diastolic dimension (EDD) mm	67.0±7.7	62.4±6.7	0.007
the average end-systolic volume (ESV) ml	150.1±49.4	108.3±38.9	0.000
the average end-diastolic volume (EDV) ml	236.7±57.9	200.3±57.9	0.007
LVEF (average)%	38.5±4.9	43.5±6.9	0.000

LVEF, left ventricular ejection fraction.

Discussion

Treatment of patients with ischemic heart disease with decreased myocardial contractility, despite the achievements of modern cardiology and cardiovascular surgery, remains a matter of debate even at present time. Most patients with CHD and low ejection fraction are candidates for heart transplantation, but on a number of socio-economical reasons, this task is the most complicated to be performed, and often this kind of care for such patients becomes simply inaccessible. In conducting medical therapy, according to the data of CASS study (Coronary Artery Surgery Study), among patients with coronary heart disease with left ventricular ejection fraction from 35% to 49%, a four-year survival comprised 71% of cases, but in patients with left ventricular ejection fraction less than 35% survival rate for the same period of observation do not exceed 50% [13].

As for bypass surgery, numerous randomized researches were carried out in patients with a low (less than 40%) LVEF, a good long-term implementation forecast was shown in bypass surgery application, however, the postoperative complications such as hospital mortality, stroke, ventricular arrhythmia, low cardiac output syndrome, sternal wound complications in this group of patients with LVEF remained high [6; 14].

In the latest years, in CHD patients with low left ventricular ejection fraction percutaneous coronary interventions have been widely used. Today it is not possible to clearly answer the question whether PCI is the alternative to CABG or it is a step in the surgical treatment of these patients. In this regard, our task was to study the immediate and long-term results of percutaneous coronary interventions in these patients.

Our investigation included 65 (47.1%) patients with low left ventricular ejection fraction (less than 45%) subjected to percutaneous coronary intervention, where we have managed to study their long-term results (for 24 months). Male patients accounted for — 80.0% (52) and female — 20.0% (13). The age of patients ranged from 39 to 76 years, and the average was 59.5 ± 8.4 years. In 44.6% (29) cases PCI were performed in patients with acute myocardial infarction; 40.0% (26) cases with stable angina FC II–IV, and in 15.4% (10) cases with progressive angina. Left ventricular ejection fraction ranged from 27.3% to 45% and averaged 38.5 ± 4.9%. According to selective coronary three-vessel coronary lesions were present in 31 (47.7%) patients, two-vessel in 19 (29.2%) and single vessel disease in 15 (23.1%) patients.

In accordance with data of N. Serota and co-authors, who analyzed the results of percutaneous coronary interventions in 73 patients with ejection fraction of the left ventricular lower than 40%, male and female comprised 72.6% (53) and 27.4% (20) respectively. The average age of patients was 62 ± 10 years. Single vessel disease was in 13 (18%) patients, two-vessel disease — in 36 (49%), three-vessel — in 24 (33%) [15].

In Serrano Jr. and co-authors current study of 162 patients with low left ventricular ejection fraction (22 ± 5%) were subjected to further surgical correction and it was found one vessel disease in 50 (30%) patients; two-vessel disease in 62 (37%) patients and in 56 (33%) patients three-vessel coronary disease [9].

In 2005 Farhan Aslam and co-authors published data of 149 patients with LVEF less than 40% (in average 35 ± 10%) after successful PCI. Patients under this study were mostly male (75%). Congestive heart failure was diagnosed in 33% of patients, angina pectoris — 13%, unstable angina — in 34%, left ventricular ejection fraction less than 30% — 35% of patients. Multivessel coronary disease was diagnosed in 80% of patients [16].

Thus, in our study, as well as in many mentioned above data, among CHD patients with reduced myocardial contractility prevailed male patients, multivessel coronary disease often occured in them.

In our study, the frequency of angiographic success with stent implantation in patients with coronary heart disease with a low LVEF fraction was 92.3% (60), the immediate success of the procedure was 85.7% (59). The frequency of complications was in 12.3% (8) cases; out of them the coronary artery dissection developed in 62.5% (5) cases; in 25% (2) cases «no-reflow» phenomenon developed and there was bleeding from the gastrointestinal tract. The incidence of myocardial infarction and death in-hospital equaled to 0. The survival rate in the long term period (24 months) without development of MACE comprised 83.1% (54). The incidence of MACE comprised 16.9% (11), of which 12.3% (8) developed lethal outcome, in 3.1% (2) — nonfatal myocardial infarction, and in 1.5% (1) cases CABG was performed.

In 2008 Briguori and co-authors published the data on treatment results of 337 patients with LVEF of 35% or less, where stents were implanted in period from April 1993 to March 2004. Hospital period was uneventful in 322 (95.3%) patients. Hospital mortality was 1.5%. During the two-year observation period, 83 died (24.6%) patients (group 1) and 254 (75.4%) were alive (group 2). Sudden death occurred in 65% of cases. Acute myocardial infarction occurred more frequently in group 1 (18% vs 5.4%, p = 0.001). Cardioverter-defibrillators were implanted in 6.7% of patients in group 1 and 20.7% of patients in group 2 (p = 0.005). LVEF improved significantly only in the 2nd group — from 29 ± 6 to 35 ± 11% (p = 0.001), while in group 1 remained unchanged (p = 0.30). Independent predictors of death in long-term period were acute myocardial infarction (95% p = 0.001), left ventricular ejection fraction was less than 25% (p = 0.006) and the completeness of revascularization (p = 0.020) [17].

V. Kunadian et al. in 2012 conducted a meta-analysis of studies using PCI in patients with systolic dysfunction of the left ventricular (ejection fraction less than or equaled to 40%) to determine the performance of hospital and long-term (over 1 year) mortality. This meta-analysis included 4766 patients totally. The average age of the patients was 65 years (95% CI: 62–68), 80% of them were men (95% CI: 75–84%). The average left ventricular ejection fraction was 30% (95% CI: 27–33%). Hospital mortality was 1.8% (39/2202, 95% CI: 1.0–2.9%). The long-term mortality (within 24 months) was 13.6% (401/2937, 95% CI: 11.0–20.7%). According to the results of clinical studies, the authors concluded that the conduct of PCI in patients

with left ventricular systolic dysfunction is as possible with a low in-hospital and long-term mortality as in coronary bypass surgery [18].

Thus, based on the analysis of our own data and on the above mentioned studies, it is evident that percutaneous coronary intervention is a safe method of revascularization in patients with low left ventricular ejection fraction.

In the study of long-term outcomes of PCI by echocardiography, left ventricular ejection fraction ranged from 30% to 61.5%, and the average was 43.5 ± 6.9% (p = 0.000). Increasing the LVEF was observed in 60% (39) patients, a decrease in 15.4% (10) patients and in 10.8% (7) patients LVEF was not changed. Patients with left ventricular ejection fraction increase after PCI in the remote period marked regression of left ventricle remodeling processes. According to echocardiogram data in these patients average end-diastolic dimension before PCI was 67.0 ± 7.7 mm, after PCI was 62.4 ± 6.7 (p = 0.007), and the end-systolic dimension before interference was 52.4 ± 7.7 mm, after interference was 47.6 ± 6.7 (p = 0.004). Middle end-diastolic volume before PCI was 236.7 ± 57.9, and after PCI was 200.3 ± 57.9 (p = 0.007); average end-systolic volume before PCI was 150.1 ± 49.4 ml, after PCI was 108.3 ± 38.9 (p = 0.000) ml.

According to D. Dudek et al., who studied the results of PCI in patients with coronary artery disease with ejection fraction less than 40% in the long term with the follow-up examination, the increase in LVEF from 38.4 ± 6 to 15 ± 50.4% (p = 0.005) was revealed. Their study included 29 patients (average age 54.4 ± 11.0 years) who were examined in 6 months after successful PCI. The authors noted significant improvement in LVEF in patients I and II functional class (FC) NYHA (from 5 to 40.4 ± 58.1 ± 9%, p = 0.0001) compared with patients belonging to the III and IV FC by NYHA, where LVEF remained virtually unchanged (from 31.4 ± 9 to 11 ± 31.8%, p = ns) [19].

Younes Nozari et al. reported on 115 patients with coronary artery disease and low ejection fraction of the left ventricle, these patients were implanted drug-eluting stents with medicine coverage. Echocardiography was performed the day before PCI, the next day, and after 3–6 months. Echocardiographic indices were compared with the results of repeated studies. The average age of the patients was 57.8 ± 8.38 years, average ejection fraction was 40.52 ± 6.36% on the day before PCI, 41.83 ± 7.14% — the next day and 44.0 ± 7.89% — in 3–6 months after PCI. In authors opinion, PCI improves LVEF in the research group of patients [20].

Thus, obtained data in the course of these studies, as well as the world literature data shows that percutaneous coronary intervention in CHD patients with decreased myocardial contractility provide improvement in left ventricular ejection fraction, thereby contributing to improved quality of life.

Limitations

Unfortunately in our study, we could not evaluate viability myocardium at patients CHD with a low LVEF before PCI and not all of them enrolled in research for long term estimation. In addition, we did not compare percutaneous coronary intervention with coronary artery bypass grafting and with medical therapy of these patients. A larger patient population and longer follow-up would be needed for evaluate of clinical results of the PCI at patients CHD and reduce LVEF.

Conclusion

Analysis of our experience shows that in patients with coronary artery disease with a low left ventricular ejection fraction (less than 45%), percutaneous coronary intervention is an effective and safe method of revascularization. Hospital mortality and development of AMI after PCI was zero, and it was 16.9% in the long term frequency of MACE, survival in the observed periods of 12 to 24 months without MACE comprised 83.1%.

Percutaneous coronary intervention in patients with coronary heart disease with decreased myocardial contractility improves left ventricular ejection fraction, thereby contributing to improved quality of life. In the long period, there was significant increasing in the average left ventricular ejection fraction up to 43.5% ± 6.9% and initial index was 38.5 ± 4.9% (p = 0.000).

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References:

1. Cohn J. N., Johnson G., Ziesche S., Cobb F., Francis G., Tristani F., Smith R., Dunkman W. B., Loeb H., Wong M., Bhat G., Goldman S., Fletcher R. D., Doherty J., Hughes C. V., Carson P., Cintron G., Shabetai R., Haakenson C.A comparison of enalapril with hydralazine-isosorbide dinitrate in the treatment of chronic congestive heart failure. N Engl J Med – 1991; – 325: 303–310.
2. Bleumink G. S., Knetsch A. M., Sturkenboom M. C., Straus S. M., Hofman A., Deckers J. W., Witteman J. C., Stricker B. H. Quantifying the heart failure epidemic: prevalence, incidence rate, lifetime risk and prognosis of heart failure The Rotterdam Study. Eur Heart J – 2004. – 25: 1614–1619.
3. Kannel W. B., Kannel C., Paffenbarger R. S., Cupples L. A. Heart rate and cardiovascular mortality: the Framingham Study. Am Heart J – 1987; 113:1489–1494.
4. Adams K. F., Dunlap S. H., Sueta C. A., Clarke S. W., Patterson J. H., Blauwet M. B., Jensen L. R., Tomasko L., Koch G. Relation between gender, etiology and survival in patients with symptomatic heart failure. J. Am Coll Cardiol – 1996. – 28: 1781–1788.
5. Bockeria L. A., Alekyan B. G., Abrosimov A. V., Aivazyan G. G. Percutaneous coronary intervention in patients with left ventricular dysfunction (ejection fraction of less than or equal to 30%). Thoracic and Cardiovascular Surgery – 2013; – 6: 10–19.
6. Bangalore S., Guo Y., Samadashvili Z., Blecker S., Hannan E. L. Revascularization in Patients With Multivessel Coronary Artery Disease and Severe Left Ventricular Systolic Dysfunction Everolimus-Eluting Stents Versus Coronary Artery Bypass Graft Surgery. Circulation – 2016. – 133: 2132–2140.
7. Poole-Wilson P. A., Uretsky B. F., Thygesen K., Cleland J. G., Massie B. M., Ryden L. Mode of death in heart failure: findings from the ATLAS trial. Heart – 2003. – 89:42–48.
8. Maurice Enriquez-Sarano Timing of mitral valve surgery. Heart – 2002; 87:79–85.
9. Serrano Jr. C. V., Ramires J. A. F., Soeiro A. M., Ce´sar LAM., Hueb W. A., Dallan L. A., Jatene F. B., Stolff NAG. Efficacy of aneurysmectomy in patients with severe left ventricular dysfunction: favorable short- and long-term results in ischemic cardiomyopathy. Clinics – 2010. – 65: 947–952.

10. Petrie M. C., Jhund P. S., She L., Adlbrecht C., Doenst T., Panza J. A., Hill J. A., Lee K. L., Rouleau J. L., Prior D. L., Ali I. S., Maddury J., Golba K. S., White H. D., Carson P. E., Chrzanowski L., Romanov A., Miller A. B., Velazquez E. J. Ten-Year Outcomes After Coronary Artery Bypass Grafting According to Age in Patients With Heart Failure and Left Ventricular Systolic Dysfunction: An Analysis of the Extended Follow-Up of the STICH Trial (Surgical Treatment for Ischemic Heart Failure). Circulation.URL: http://dx.doi.org/10.1161/CIRCULATIONAHA.116.024800 (October 2, 2016).
11. Sergeant P., Blackstone E., Meyns B. Validation and interdependence with patient-variables of the influence of procedural variables on early and late phase after CABG. Eur J Cardiothorac Surg – 1997; – 12:1–19.
12. Hawkes A. L., Nowak M., Bidstrup B., Speare R. Outcomes of coronary artery bypass graft surgery. Vascular Health and Risk Management – 2006; – 2: 477–484.
13. Mock M. B., Ringqvist I., Fisher L. D., Davis K. B., Chaitman B. R., Kouchoukos N. T., Kaiser G. C., Alderman E., Ryan T. J., Russell RO Jr., Mullin S., Fray D., Killip T. 3rd. Survival of medically treated patients in the Coronary Artery Surgery Study (CASS) registry. Circulation – 1982; – 66: 562–568.
14. Soliman M. A., Hamad K., Peels A. Van Straten, A. Van Zundert and J. Schönberger. Coronary artery bypass surgery in patients with impaired left ventricular function. Predictors of hospital outcome. Acta Anaesthesiol Belg – 2007. – 58:37–44.
15. Serota H.1., Deligonul U., Lee W. H., Aguirre F., Kern M. J., Taussig S. A., Vandormael M. G. Predictors of cardiac survival after percutaneous transluminal coronary angioplasty in patients with severe left ventricular dysfunction. Am. J. Cardiol – 1991; – 67:367–372.
16. Farhan A., Blankenship J. C. Coronary artery stenting in patients with severe left ventricular dysfunction. Journal of Invasive Cardiology – 2005. – 17: 651–654.
17. Briguori C., Aranzulla T. C., Airoldi F., Cosgrave J., Tavano D., Michev I., Montorfano M., Carlino M., Castelli A., Sangiorgi M. G., Colombo A. Stent implantation in patients with severe left ventricular systolic dysfunction. Int J Cardiol – 2009. – 135: 376–384.
18. Kunadian V., Pugh A., Zaman A. G., Qiu W. Percutaneous coronary intervention among patients with left ventricular systolic dysfunction: a review and meta-analysis of 19 clinical studies. Coron Artery Dis – 2012. – 23: 469–479.
19. Dudek D.1., Rzeszutko Ł., Turek P., Sorysz D., Dubiel J. S. Clinical predictors of left ventricular function improvement after percutaneous coronary interventions in patients with ejection fraction below 45%. Przegl Lek – 2001. – 58: 751–754.
20. Nozari Y., Oskouei N. J., Khazaeipour Z. Effect of elective percutaneous coronary intervention on left ventricular function in patients with coronary artery disease. Acta Medica Iranica – 2012; – 50: 26–30.

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Prevalence human papillomavirus with high-risk among women with precancerous diseases of the cervix uteri

Abstract: The article presents research data 515 women who carried out the molecular biological study of cervical scrapings under the opportunistic screening for human papillomavirus (HPV) in the Institute of Virology of the Ministry of Health of Uzbekistan, aimed gynecologists after a visual inspection, and is suspected of precancerous and background diseases of the cervix. In 100 (19.4%) out of 515 women HPV genetic material has been found with high oncogenic risk that corresponds to the average level of HPV prevalence worldwide.

Thus, HPV testing in a primary marker cervical pathology studies will reduce the volume five-fold to redistribute more attention to the real risk of women with cervical cancer, which in turn will increase the effectiveness of preventive screening.

Keywords: Human papillomavirus, oncogenic risk, preventive screening.

Human papillomavirus (HPV) is the most common viral infection of the genital tract. Most sexually active men and women acquire the infection at some point in their lives, and some can be re-infected [1].

The peak period of acquisition of infection for both women and men begins as soon as they become sexually active. HPV is sexually transmitted, but transmission is not obligatory penetrative sex. Flesh genital contact is a well-established mode of transmission.

Many types of HPV do not cause problems. HPV infections usually pass by themselves without any intervention a few months after their purchase, and 90% are for 2 years. A small proportion of infections by certain types of HPV can persist and develop into cancer [2].

Today, cervical cancer is the most common disease associated with HPV. Nearly all cases of cervical cancer may be caused by HPV infection.

Despite the limited data on anogenital cancers other than cervical cancer and, more and more evidence shows HPV due to cancer of the anus, vulva, vagina and penis. Although these types of cancer are less common than cervical cancer and their relationship with HPV making them potentially preventable through the use of the same primary prevention strategies, as well as for cervical cancer [3; 4].

The types of HPV that do not cause cancer (particularly types 6 and 11) can cause genital warts, and respiratory papillomatosis (a disease in which tumors grow in the respiratory tract, leading from the nose and mouth into the lungs) [5]. Although these conditions are very rarely lead to death, they can often lead to disease. Genital warts are common and highly contagious [6].

To date, among the states of cancer markers in the screening organization in the world all of HPV testing in women more often selected and subsequently study for cervical pathology routine colposcopic and cytological methods [7–10]. Uzbekistan has not yet introduced a standardized system of tracking the HPV and precancerous diseases. Women are recorded on the stage of cancer. Early detection of precancerous conditions, would reduce the incidence of terrible diseases and reduce the economic burden of the disease.

Purpose of the study. The study of the incidence, range and load genotypes of human papillomavirus high risk among women with precancerous and underlying diseases of the uterus in order to develop the optimum system for the early screening of cervical cancer.

Material and methods. It was carried out molecular biological study of cervical scrapings of women within the framework of opportunistic screening for HPV in the Institute of Virology of the Ministry of Health of Uzbekistan, aimed gynecologists after a visual inspection, and is suspected of precancerous and background diseases of the cervix. The study was conducted using a set of reagents for the detection and quantification of DNA of human papillomavirus (HPV) high carcinogenic risk (WRC) 16, 18, 31, 33, 35,39, 45, 51, 52, 56, 58, 59 types of clinical material by polymerase chain reaction (PCR) with hybridization-fluorescence detection "AmpliSens®VPCh WRC-screen-titre the FL" production "InterLabService" Ltd., Russia. The study was conducted in three phylogenetic groups: A7 — types 18, 39, 45, 59; A9–16, 31, 33, 35, 52, 58; A5/A6–51, 56.

Results. A survey of 515 clinical specimens from 100 women (19.4%) revealed the presence of HPV genetic material with a high oncogenic risk. It was found that 43.7% of those infected marked A9 type and follow the type A8/A6 at 36.8%. In less celebrated type A7 19.5%. In 24 cases, exmentioned combination of two or more types: A7 and A9 in 6 (6%), A9 and A5/A6 13 (13%) and A7 and A5/A6 5 (5%) of cases. In 2 cases, it noted the presence of all three groups. The average age of the women ranged from 23 to 48 years old, mean age was 43.9 years (95% CI 24 to 44). (Figure 1) for the phylogenetic group A5/A6 showed a statistically significant (p=0.038), higher age of 40.7 years (95% CI 30.2–51.2). For phylogenetic group A9 has the lowest average age of 31.0 years (95% CI 27,7–34,2). For phylogenetic group A7 average age was 34.1 years (95% CI 28,6–39,6).

In two-thirds of all cases (67%) had an increased concentration of the virus in 25% of cases observed at clinically relevant concentrations, and in 8% of cases, there is no clinically relevant concentrations. For phylogenetic A5/A6 group noted the prevalence of cases with clinically significant levels of virus for the group A7 cases with clinically significant levels and cases with high concentration were observed to the same extent. The phylogenetic group of the A9 noted the prevalence of cases with a high concentration.

The results of our studies show the average level of prevalence of HPV infection due to opportunistic screening, which corresponds to the average level of prevalence worldwide [1]. There is a variety of prevalence of phylogenetic groups and virus concentration. So A5/A6 phylogenetic groups observed at an older age, but in lower concentrations, whereas the group A9 is marked at younger ages and in greater concentration.

Only one-fifth of women, visually defined by practitioners have the HPV virus, which may indicate the low specificity of the supervision of the cervical pathology at the level of primary health care. The use of HPV testing as a primary marker of cervical pathology will reduce the amount of research in five times and redistribute more attention to women with a real risk of cervical cancer, which in turn will increase the effectiveness of preventive screening.

References:

1. Einstein M. H. Clinician's guide to human papillomavirus immunology: knowns and unknowns//Lancet Infect Dis. – 2009. – Vol.9, – No 6. – P. 347–56.
2. Smith J. S. Human papillomavirus type distribution in invasive cervical cancer and high-grade cervical lesions: a meta-analysis update//Int J Cancer. – 2007. – Vol. 121, – No 3. – P. 621–32.
3. Pogoda .S., Roden R. B., Garcea R. L. Immunizing against Anogenital Cancer: HPV Vaccines//PLoS Pathog. – 2016. – Vol. 12, – No 5. – P. E 1005–587.
4. Cobos C. The role of human papilloma virus (HPV) infection in non-anogenital cancer and the promise of immunotherapy: a review//Int Rev Immunolю – 2014. – Vol.33, – No 5. – P. 383–401.
5. Entiauspe L. G. Uncommon non-oncogenic HPV genotypes, TP53 and MDM2 genes polymorphisms in HIV-infected women in Southern Brazil//Braz J Infect Dis. – 2014. – Vol. 18. – No 6. – P. 643–50.

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Features of physical development and bone mineral density in children with chronic bronchitis

Abstract: The estimation of physical development, bone mineral density and the relationship between these parameters in patients with chronic bronchitis have been carried out. The study enrolled 84 children with chronic bronchitis aged 10–16 years. Of them, 37 (35.7%) — girls and 47 (64.3%) — boys. It was revealed that in children with chronic bronchitis there are significant adverse changes in the key somatometric indicators, bone mineral density and biochemical markers of bone formation, the extent of which is closely correlated from remteness, severity of the disease, which necessitates the development of targeted interventions.

Keywords: chronic bronchitis, physical development, osteopenia.

Epidemiological studies carried out in various countries of the world show a steady increase in the number of lower respiratory tract diseases, which have attracted attention due to a high prevalence, disability and mortality [5; 8].

The delay of physical development often leads to difficulties in psychological and social adaptation, the consequences of which can persist even when they reach the normal physical development. The psychological effects of short stature have a negative impact on the social integration of children and adolescents, lead to the restriction of professional capacity [1; 2; 3; 6; 7; 10].

One of the serious complications of chronic lung disease is respiratory insufficiency, delayed physical development and decrease in bone mineral density, due to the underlying disease pathogenesis. There are few data confirming that delay of physical development and osteopenia develops in severe progressive course of chronic lung disease [4; 11]. At the same time it was found out what anthropometric indices were largely changed, the relationship of such disturbances with severity of patients condition and the disease duration, the markers and predictors of osteopenia development were not defined. Meanwhile, these data are of great scientific and practical importance.

Taking into account the above data, the study, directed to investigation of physical development and bone mineral density in children with chronic bronchitis (CB) was carried out.

Purpose of the research. To study the features of physical development, bone mineral density and the relationship between these parameters in patients with chronic bronchitis.

Materials and methods. A total of 84 (46 obstructive, 38 nonobstructive) children with chronic bronchitis at the age of 10 to 16 years were studied. Of them, 37 (35.7%) — girls and 47 (64.3%) — boys. According to duration of the disease, the patients were distributed as follows: 5–6 years old 32 (38%), 7 years old 14 (16,7%), 8 years old 13 (15,5%), 9 years old 12 (14,3%), 10 years old and more 13 (15,5%) children. By the degree of severity of the condition, the patients were divided as follows: medium heavy course of the disease was revealed in 48 (51,1%) children, heavy — in 46 (48.9%). Indicators of physical development were evaluated by the absolute values of length, weight and chest circumference. Body mass index was calculated using the formula BMI = weight/height (m2). The received data were compared for children's growth and development of the standards recommended by WHO (2007). External breathing function was examined using «Medicor» spirography company (Hungary). Biochemical studies included determination of the content of Ca +, phosphorus, and alkaline phosphatase in blood serum by immune enzyme analysis using a standard set of "Human" firm (Germany). The concentration of TNF-α cytokine IL-1b, IL-6 in blood serum were determined by hard phase immune enzyme analysis (IEA) using a test system for «IEA — TNF-α, IL-1b, IL-6» («Vector-Best» Russia, 2009). Bone mineral density was measured by osteodensitometry on the unit "SONOST 3000", equipped with a children's program (South Korea). The results of ultrasound osteometry chronic bronchitis patients were compared with those of the control group of healthy children (n = 42). Measurement of the bone strength was carried out on the heel bone. The criterion of osteopenia was considered to be the decline in BMD from — 1 to –2,5 SD for Z- criterion, and SD decrease to more than –2,5 was classified as osteoporosis.

Results of the research and their discussion. Harmonious physical development was determined in 14.3% of patients. These patients were mainly with disease duration of 5 years, and whose, exacerbation of the disease was observed infrequently and had a mild course. Delayed physical development was revealed in 72 patients, accounting for 85.7% of the total number of examined patients, 32 of them (44.4%) — were girls and 40 (55.6%) — were boys. Individual analysis of anthropometric data showed: 61 (84.7%) patients had a delay of average growth in 69 (95.8%) lass of body weight. In 11 (15.3%) patients aged 15–16 years, body length was above average and significantly ($P < 0.05$) different from the group of healthy peers. Differential analysis by age showed that the maximum frequency of FR disturbances in boys accounted for 12,13, 14 and 15 years old whose indicators were in –3SD zone ($P < 0.001$), 16-year-olds were in –2SD zone — 3SD ($P < 0.05$), and

the most rare in the group of 10,11 years old — in 4 (10%) patients with P> 0,1. In patients of both genders with a delay of physical development a decrease in weight and growth index occurred, which was in –2SD — –3SD zone. This points to a significant underweight. When comparing the data of the physical development of children with severity and duration of chronic bronchitis, we noted a clear link between them. The more severe and prolonged the illness proceeded, the more often the children's physical development was delayed r = 0,50; r = 0,39 (P <0.05). In spirography and peak flow metry the of decline in forced expiratory volume in 1 second. (FEV1) and PEF in patients with chronic bronchitis in relation to the proper values it was revealed: Moderate sererity (FEV1 and PEF 60–79% of normal) in 44 (46.8%), severe (- FEV1 and PEF <60% of normal) in 13 (13.8%) patients. When studying capillary blood oxygen saturation, we have found the oxygen reduction to 80.2 ± 4.2% with chronic bronchitis, whereas in healthy children, this index was equal to 98,5 ± 1,5%. Reduced bone mineral density (BMD) was diagnosed in 74 (88%) children with chronic bronchitis. The frequency of osteopenia was determined in 46 (62,2%) children, osteoporosis in 28 (37,8%) patients. It was revealed that bone mineral density (BMD) is closely related to the length (r = 0,80), body weight (r = 0,88), BMI (r = 0,65).

Overall, our findings suggest a significant negative impact of chronic bronchitis on bone mineral density, the cause of which is likely associated with chronic hypoxemia, adversely affecting the harmonious development. Patients with osteoporosis differed with severe underlying disease, early onset of clinical symptoms, frequent exacerbations of chronic bronchopulmonary process, resistant hypoxemia and marked impairments of bronchial patency.

When studying the effect of disease duration on bone mineral density of the interrelation between them has been established. So when the disease duration iz more than 9 years the majority of patients 26 (35,1%) had osteoporosis r = 0,45 (P <0.05). In the study based on gender significant differences were not observed. The study on the content of calcium, phosphorus, and alkaline phosphatase in the blood was also carried out. The results of studies of mineral metabolism showed that, calcium in healthy children group was 2,5 ± 0,03 mmol/l. In the group of patients with chronic bronchitis Ca was reduced to 1,77 ± 0,04mmol/l (P <0,001). Inorganic phosphorus level in healthy children was 1,25 ± 0,02 mmol/l. When considering the level of inorganic phosphorus indicators a significant decrease in patients with chronic bronchitis 0,8 ± 0,05mmol/l (P <0,001) was revealed. In healthy children alkaline phosphatase level was 290 ± 8.92 U/l. We found a tendency to AlPh 305 ± 7,4U/l increase in patients with HB aged 12–13years (P> 0.1) compared to the control. The group of patients aged 15–16 years showed a significant decrease in alkaline phosphatase compared with controls (P <0.05). From the literature it is known that alkaline phosphatase activity largely depends on the age and, to a lesser on patients gender [4; 9]. In, in particular, increases during puberty and is associated with the intensive growth of bone tissue, so in children from 10 to 14 years OAlPh concentration increases to 280E/l and from 15 to 19 years begins to decrease to 160 U/l. In our studies, this pattern of OAlPh changes were not observed. Summarizing the results of the analysis of OAlPh concentration by age groups, it is possible to come to the conclusion that in patients with chronic bronchitis the process of osteoblast differentiation is slowing down.

It is known that in hypoxia IL-1, TNF-a and IL-6activate, which promotes osteoclastic resorption of bone tissue [4]. As it can be seen from Table 1, the revealed content of pro-inflammatory cytokines IL-1, IL-6, TNF-alpha in the blood serum of patients with chronic bronchitis, is significantly higher than their levels in healthy children.

Table 1. – The level of IL-1β, IL-6 and TNF- α in chronic bronchitis children, (M ± m)

Indices	Control n=45	In children with chronic bronchitis, n=56
ИЛ-1β, пг/ml	21,5±2,2	229,6±5,4
ИЛ-6, пг/ml	27,9±2,5	119,6±6,2
TNF, апг/ml	27,6±2,3	120,1±4,6

Increasing concentrations of IL-1β was clearly allocated, it was 10 times higher and, IL-6, which was 4,3 times higher than the control level as compared to the control group. It also significantly it came to TNF-α level. This cytokine has been 4.3 times higher than the control level (P <0.001). Premature apoptotic death of osteoblasts, the stimulants of which are apparently IL –1 and TNF-α can lead to impairment of bone tissue remodeling process in chronic bronchitis. The analysis of the literature data suggest that IL — 6, act as growth factors of osteoclast progenitors and has indirect effect on bone tissue resorption, while IL –1β, TNF-α stimulate osteoclast maturation steps [4].

Conclusions. Thus, the contact materials of the morphological characteristics of physical development, the features of calcium-phosphorus metabolism and bone system in patients suggest that in children with chronic bronchitis there are significant adverse changes in the main somatometric indices, bone mineral density and biochemical bone formation markers and their, degree depends on duration, severity of the disease. In order to ensure the normal development of the physical parameters is necessary to promptly recognize and treat, and reduce the impact of risk factors for the disease. Increased levels of proinflammatory cytokines in patients with children determine the need for monitoring of mineralization of the skeleton as a basis for the primary prevention of osteoporosis in adults.

References:

1. Ahmedova D. I., Rahimjanov Sh. A. Growth and development of children. Methodical recommendation. – Tashkent, – 2006, – P. 3–82.
2. Baranov A. A., Scheplyagina L. A. Physiology of growth and development of children and adolescents (in theory and clinical issues) – Moscow, – 2006. – Vol. 2. 460 p.
3. Dautov F. F., Lysenko A. I., Yarullin A. H. Influence of environmental factors on the physical development of children of preschool age//Health and Sanitation. – 2001, – No 6, – P. 49–55.
4. Zyatitskaya A. L. The problem diagnostics reduce bone strength in children//Bulletin of the Siberian medicine. – 2009. – No 2. – P. 76–85.
5. Kaganov S. Y., Rozinova N. N. Bogarad A. E. Lung diseases in the light of the International Statistical Classification of Diseases X review//Ross. Journal of Perinatology and Pediatrics, – No 2, – 2002. – P. 6–9.
6. Crans V. M. Physical development of children with renal pathology.//Pediatrics. – 2007. – P. 73–80.

7. Mamedova Galina Features of different options of puberty, hypogonadism in males and ways of their correction.: Author. Dis … PhD. – Tashkent – 1998–20 p.
8. Smirnova M. O., Rozinova N. N. Chronic bronchitis in children. Definition, clinical variants//Russian Gazette and Perinatology, Pediatrics – 2004, – No 3, P. 14–17.
9. Hramtsova S. N., Scheplyagina L. A. et al. Age-related changes in patterns of biochemical markers of bone remodeling in 5–16 let children. Congress of pediatricians of Russia "Actual problems of pediatrics"//Problems of modern pediatrics. – 2006. – No 5. – P. 621.
10. Yampol'skaya Y. A. Regional diversity and standardized evaluation of the physical development of children and adolescents.//Pediatrics, – 2005, – No 6, – P. 73–75.
11. De Vries F., van Staa T. P. et al. Severity of obstructive airway disease and risk of osteoporotic fracture//Eur Respir – 2005. – No 25, – P. 879–884.

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Polymerase chain reaction in diagnostics of an enteroviral infection at patients with implications of acute intestinal infection

Abstract: Results of a laboratory research of 170 patients with acute intestinal infection (AII) regarding identification of enteroviruses are presented in article. It was taped that an appreciable part of AII is presented AII to an enteroviral etiology. Features epidemiological features and a clinical picture of a disease were defined.

Keywords: enteroviral infection, acute intestinal infection, polymerase chain reaction.

Introduction. In recent years activation of an enteroviral infection (EVI) in all regions of the world, irrespective of their social and economic development becomes perceptible. Often EVI is difficult to make the diagnosis that is bound to a variety of clinical forms of illness, which similar under traditional respiratory infections or intestinal infections in this connection early diagnostics of enteroviral infections and well-timed delivery of health care is complicated. A variety of various forms of acute intestinal infection doesn't allow us to establish the final diagnosis in this connection laboratory confirmation of the diagnosis surely is required. In such cases diagnostics of EVI in structure of acute intestinal infections requires use of the polymerase chain reaction (PCR). The most important advantage of the PCR before other methods, is its high sensitivity allowing to define single molecules of infectious pathogens. So, the PCR allows to define a contagium, to carry out monitoring of geographical distribution of options of EVI. Due to above listed by us the work object was set: to define EVI contribution in development of symptoms of acute intestinal infection (AII) in patients of the Kashkadarya region of Uzbekistan.

Material and methods: The clinical laboratory research of 170 patients from AII on the basis of the Regional infectious diseases hospital of Qarshi is conducted. At all patients from AII for identification of RNA of enteroviruses the PCR method was carried out. Excrements which got for 1–3 days are investigated. PCR was conducted (3) at the Reference laboratory of the Research Institute of Virology of the Ministry of Health of the Republic of Uzbekistan by means of the Ampli-sens Enterovirus test system (TsNIIE of Ministry of Health of the Russian Federation, Moscow).

The results of the research and their discussion. Results of a research showed that in fecal samples of 170 patients from AII the 73rd on identification of an EV had a positive result that made 43%, Thus, almost each 3 and 4 patient from AII at the heart of an etiological factor of a disease had an enteroviral infection. Among patients from aII and the confirmed enteroviral infection children from the birth up to 18 years — 50 children (68,4%) prevailed, at the same time the largest frequency was made by children of early age till 1 year — 21 children (28,7%), children of 1 year to 3 years made 18 people (24,6%), there were only 4 children from 4 to 7 years (5,4% of cases), from 8 to 14 years — 3 children (4,1% of cases), from 15 to 18 years of 5 children (6,8% of cases) and the remained contingent adults made, so sick from 19 to 30 years made 11 people (15,5% of cases) and 30 years of 10 patients (13,6%) are more senior. Thus, our data coincide with data of literature which speak about the largest frequency of distribution of the EVI intestinal form at children of early age. This fact is bound to the reduced local immunity of children of early age, especially if children don't receive or receive not enough breast feeding, the gastro intestinal tract GIT forming local immunity. At the same time prevalence of boys/men 43 (59%), against girls/women — 30 became perceptible (41%).

At the collecting of the epidemiological anamnesis first of all prevailed giving not boiled raw water from open reservoirs, even to children till 1 year of life: 32 patients (43,8%), at other contingent were taped meal in public dining rooms — 9 patients (12,3%), 15 mothers (20,5%) claimed that the diarrhea at their children developed after contact to patients with an ARD and AII.

At other sick causal factors of development of AII it wasn't succeeded to tap (17 patients — 23,2%). When determining the residence of patients it was taped that most of all patients with the EVI intestinal form arrived from rural areas. Prevalence of larger number of patients with EVI from the rural area — 56 patients (76,7% of cases) tells about a possible water factor of transfer of an EV.

In diagnostics of EVI detection of seasonal features was important, it was so taped that at observation in spring and summer — the autumn period, the greatest number of patients with the taped EV by means of the PCR was observed in May — 54 cases (73,9%) when comparing with patients at which the negative result on an EV was observed, it was taped that at this contingent of patients the greatest case rate was distributed almost evenly in April and May months — 46,3% and 42,1% of cases.

The disease at patients of an enteroviral etiology generally began with All sharply 56 (76,7%). Patients arrived for 1–2 days of

a disease of 29 (39,7)%, at the same time 27 (36,9%) patients 2 (2,7%) for 7–8 days, 2 (2,7%) for the 10th day were hospitalized for 3–4 days from the beginning of a disease, 10 (13,5%) for 5–6 days, and more than put from the beginning of a disease and 3 (4,1%) patients considered themselves patients during the long time. The acute beginning of a disease at the main contingent of patients will completely be compounded with literature data (1–2).

It is necessary to notice that at patients with the EVI intestinal form the general state was in most cases regarded as moderately severe 50 (68,4%), but in the comparative analysis it was taped that the number of cases with a serious current of this form prevailed in group with a positive PCR result on an EV (19 (25,7%) at EVI and 20 (21,05%) at patients with negative result).

The intoxication syndrome became perceptible at all patients from the first day of illness and lasted on average 3,72±0,46 days. High temperature of febrile character was observed at 11 (15,06%) patients whereas the subfebrile condition occurred at the majority 49 (67,1%) patients from AII, normal body temperature was diagnosed at only 13 (17,8%) patients. It is compounded with data of literature (1–2) where it is indicated the relative mild current of the EVI intestinal form, with moderate intoxication.

The specific gastrointestinal tract disease at patients with the EVI intestinal form in 100% of cases was characterized by a loss of appetite, at a part of patients 7 (9,5%) the anorexia was observed. At 17 patients (23,2%) abdominal pains were observed. Often the diarrhea was followed by nausea — at 18 (24,6%), vomiting — at 14 (19,1%). Almost at all patients the liquid chair without pathological impurity from 5–6 at 32 (43,8%) patients, and till 10–12 once a day — at 13 was observed (17,8%). At only 2 patients (2,7%) of the studied selection it was observed impurity of slime, pus and a blood in a chair. At the same time at 12 (16,4%) patients the condition of a serious dehydration of which the main part was made by children of early age of 10 children (83,3%) developed.

It is necessary to notice that at 16 of 21 (76,1%) sick adult age with EVI the accompanying pathology in the form of chronic cholecystitis, chronic pyelonephritis, chronic gastritis, chronic hepatitis and a helminthic invasion became perceptible. We consider that this chronic pathology in a GIT promotes dysfunction mucous an intestine and as a result to a larger susceptibility of an organism as to EVI and other intestinal infections. In group of comparison with negative result of the PCR at 11 of 31 (35,4%) adults the accompanying chronic pathology of a GIT was observed.

From background diseases the larger frequency of anemia of serious degree at patients with the EVI intestinal form attracts attention. Perhaps, this fact is one of EVI provoking for more mild perception as anemia promotes depression of immunobiological properties of an organism. So anemia frequency degrees 3 made a half of cases of observations 37 (50,6%), at the same time there were 24 patients with the 2nd degree of anemia (32,8%), only 11 (15%) cases patients with mild degree of anemia made and at only 1 (1,3%) the patient a hemoglobin within norm was observed. When comparing with group with negative result of the PCR it was taped that the number of patients with serious anemia made in this selection 35 (36,8%), moderately severe anemias of 42 (44,2%), mild degree 15 (15,7%) and at 3 (3,1%) a hemoglobin was within norm.

Conclusions: In structure of patients from AII at 43% positive takes of the PCR on existence of an EV were taped, at the same time children till 1 year prevailed. The major causal factor of distribution of EVI were giving raw unboiled water from open reservoirs in rural areas that speaks about a possible water factor of transfer of an EV. The disease was characterized by an acute current and moderate severity against the background of anemia of serious degree.

References:

1. Lukashev A. N., Ivanova O. E., Khudyakova L. V. The social and economic importance of an enteroviral infection and its role in structure of infectious pathology in the world//Journal of microbiology, epidemiology and immunobiology – 2010. – No 5 – P. 113–120. (In Rus.).
2. Musabayev E. I., Nazarova R. P., Bayzhanov A. K., Kasimova R. I. Enteroviral infections etiology, clinic, diagnostics, treatment. Methodical Recommendations Tashkent. – 2010. – (In Rus.).
3. Poklonskaya N. V. et al. Use of various modifications of a method of a polymerase chain reaction at diagnostics of enteroviral infections//Medical news, – 2004. – No. 1, – P. 13–16. (In Rus.).

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The impact of the radio-frequency catheter ablation on the emotional status of the patients with AV nodal reentrant tachycardia

Abstract: The evaluation of the level of anxiety and depression in patients with AV nodal reentrant tachycardia after radiofrequency catheter ablation was performed. The study included 33 patients with AV nodal reentrant tachycardia (AVNRT). The expressiveness of the anxiety and depression level was assessed with the help of the Hospital anxiety and depression scale. The majority of patients with AVNRT had clinically expressed anxiety (63,6%) and sub-clinical depression (66,7%) before treatment. Against the background of RFA application, normalization of psychical status of the patients (reduction of the feeling of anxiety/depression in 84,8%/93,9% respectively) was observed.

Keywords: AV nodal reentrant tachycardia, anxiety, depression, radio-frequency catheter ablation.

AV nodal reentrant catheter ablation (AVNRT) is a supraventricular tachyarrhythmia characterized by a coordinated electrical activation of auricles and ventricles appearing as result of realization of the reentry mechanism in the AVC area. The share of AVNRT accounts for 85% of all supra-ventricular arrhythmias provided the exclusion of fibrillation of auricles [2; 10]. The correlation of men and women is 2:3. Despite the fact that AVNRT occurs in all age groups, there are certain age period that play important role in the clinical course of AVNRT. In children, most frequently, tachycardia manifests itself at the age of 7–12, and the frequency of attacks increases during the age of 12–13. The decrease of the frequency of attacks is often observed at the age of 14–16 [6]. In adults, clinically expressed manifestations are, as rule, observed in the group aged from 28 to 40 [13; 15].

According to Ardashev V.N. [3], in 18% of patients with AVNRT, the reason initiating the arrhythmia is physical or emotional stress. During the study of the quality of life of patients with AVNRT, we found that 48,8% had emotional changes related to the attacks of tachycardia. During the analysis of the psychological component of health, the decrease of the indicator of life activity (by 26,1%) that reflects the feeling of cheerfulness was observed. The decreased level of the indicator of the emotional-role functioning (by 31,5% lower compared with the clinical control) certifies about the presence of problems in patients (concern about health, decrease of mood), which have significant negative impact on their social activity and daily role activity [14].

Epidemiological data of the last decades shows a high occurrence of depressive, anxiety disorders in general medical and cardiology practice. The interrelation of stress, anxiety and depression in patients with cardio-vascular diseases has been known to researchers for long, but only in the recent years, this interrelation started being proved from the position of evidence-based medicine, where it is indicated that such disorders are one of the reasons of significant deterioration of QL of the patients, reduce the patients' adherence to treatment and affect their working and labor capacity [1; 5; 8; 11].

We did not find information about anxiety-depression states in patients with AVNRT in available literature sources.

The goal of the research is to assess the level of anxiety and depression in patients with AVNRT after radio-frequency catheter ablation.

Materials and methods. The study included 33 patients with AVNRT. Among them, there are 6 (18,2%) men, 27 (81,8%) women. The mean age was 38,6±13,2 (Me 37 years old; IQR 30,0–49,0). The arrhythmic anamnesis was 6,1±3,6 years (Me 6,5 years; IQR 2,8–9,0).

The control group included 24 almost healthy people (men — 7 (29,2%); women — 17 (70,8%)) aged 39,4±3,1 years (Me 40,5 years old; IQR 28,0–51,8) without structural pathology from the side of cardio-vascular system. The groups of the examined people were comparable by age and sex.

The procedures of IC EPS (intra-cardiac electrophysiological study) and RFA were conducted according to standard method. All stages of the research were performed consistently in the course of one operational session with the use of electrophysiological complex «Elkart II» (by «Elektropuls», Tomsk, Russia). Under local anesthesia Sol.Novocaini 0,5% — 40,0 ml and according to the Seldinger technique, the right jugular vein and the left femoral vein were punctuated, through which, with the help of introducers, 2 electrodes for EPS and RFA conduct in the position of CS and RVa were inserted in the cardiac cavity.

Initially, the sinus rhythm is registered on ECG. Them EPS was performed. Then, there was puncture of the right femoral vein, through which, ablation catheter was inserted into cardiac cavity and was installed in the area of slow passages of AVC. In this zone, the RF effects with the following parameters (T=50–55 C; P=25 Wt; *electrode resistance* I= 100–110 Ohm) were performed. During the conduct of RFA, slow nodal rhythm was registered. Then, control standard EPS was performed.

The presence and degree of expressiveness of anxiety-depression disorders was assessed with the help of the Hospital anxiety and depression scale. During the interpretation, the total indicator for every sub-scale was taken into account, defining three areas of its values: 0–7 — norm (absence of significantly expressed symptoms of anxiety and depression); 8–10 — sub-clinically expressed anxiety/depression; 11 and higher — clinically expressed anxiety/depression.

Statistical processing of changes of the evaluations of the QL was done with the help of computer programs STATISTICA 6 and Biostat. The quantitative indicators were presented in the form of M±SD, as well as the median (Me) and 25 and 75 percentiles (IQR). The differences between the groups were considered statistically significant at $P<0,05$.

Results and discussion. During the analysis of complaints, it was established that during the paroxysm, patients felt weakness (33,3%), uncontrolled attacks of anxiety (27,3%), vertigo (21,2%), feeling of baseless fear (18,2%), strong urges to urinate (6,1%), feeling of pulsation in the vessels of the neck (6,1%), unconsciousness (3,0%).

In more than half (54,5%) of patients, the factors causing the appearance of arrhythmia were not established; in 8 (24,2%) patients, the reason was physical stress (intensive activity, lifting and moving of heavy objects during construction and renovation works), herewith, half (50,0%) of them were young men of working age (from 21 to 50). 7 (21,2%) had stress and nervous overloads that cause arrhythmia.

The significant part of patients suffered from cardio-vascular system diseases: hypertonic disease was diagnosed in 13 (39,4%) patients, ischemic heart disease — in 6 (18,2%), chronic focal myocarditis — in 4 (12,1%); prolapse of mitral valve and chronic rheumatic heart disease were verified in 9,1% and 6,1% of patients respectively.

According to the data of the hospital anxiety and depression scale, the absence of anxiety state (clinical norm) before RFA was established only in 1 (3,0%) patient (Table 1.).

Clinically expressed anxiety was observed in significantly bigger number of patients (63,6%), than subclinical anxiety (33,3%; OR 3,64; 95% CI 1,30–10,2; p=0,02). The total indicator of the level of anxiety was 11,1±2,4 points and corresponded to clinically expressed anxiety.

The majority (66,7%) of patients had subclinical variant of depression. 8 (24,2%) patients had clinically expressed depression with insignificantly expressed reduction of mood and anxious concerns. The absence of the depressive symptoms was established in 3 (9,1%) patients. The total value of the level of depression accounted for 9,8±1,8 points and corresponded to the indicator of the subclinically expressed disorders.

The significant part (75,8%) of patients connects the state of anxiety with the attacks of heart-beating and interruptions in the heart operation, feeling of heart stop, with the need to self-limit in alcohol, coffee, strong tea, smoking as well as difficulties in realization of usual rest, house work, sport activities and hobby.

According to different authors, the presence of the anxiety and depression is an unfavorable factor in terms of prognostics in patients with cardio-vascular diseases. It is important to not only establish the diagnosis of anxiety or depression disorder, but also maximally fully reveal all psychopathological symptoms in every concrete patient [7; 8].

Table 1. – The expressiveness of anxiety and depression in patients with AVNRT

Parameters	Before RFA, n=33		After 6 months, n=33		12 months, n=33	
	Abs.	%	Abs.	%	Abs.	%
Clinical norm	1	3,0	28	84,8	33	100
Sub–clinical anxiety	11	33,4	5	15,2	–	–
Expressed anxiety	21	63,6	–	–	–	–
Total points	11,1±2,4		5,7±1,7		2,8±1,1	
Clinical norm	3	9,1	31	93,9	33	100
Sub–clinical depression	22	66,7	2	6,1	–	–
Expressed depression	8	24,2	–	–	–	–
Total points	9,8±1,8		4,9±1,8		2,4±1,4	

The disruptions of the rhythm of heart often limit the professional suitability and working ability of young patients without organic heart diseases [4; 9; 12].

Radio-frequency ablation (RFA) has been used for many years to treat various disorders of heart rhythm and has proved to be a highly effective and safe method. The advantage of this method of treatment is obvious, because in the successful ablation of the source of arrhythmia, the patient is cured from the disease for good [12].

During the conduct of the analysis of the psychological status of the patients after 6 months post RFA, we established the absence of the patients with clinically expressed anxiety and depression. Insignificant reduction of the number of patients with sub-clinical anxiety (15,2%; OR 0,36; 95% CI 0,11–1,18; p=0,15), and significant reduction of the share of patients with sub-clinical depression (6,1%; OR 0,03; 95% CI 0,01–0,16; p<0,0001) was registered. The total points of anxiety (up to 5,7±1,7 points; p<0,0001) and depression (up to 4,9±1,8 points; p<0,0001) decreased. The normalization of psychical status was established in the majority of patients (anxiety in 84,8%; depression — 93,9%).

The test in accordance with the hospital anxiety and depression scale after 12 months showed that all patients had no significant symptoms of anxiety and depression. The total points of anxiety accounted for 2,8±1,1 points (p<0,0001), depression — 2,4±1,4 (p<0,0001).

In the course of the research, the frequency of occurrence of manifestations related to anxiety-depressive states was evaluated. The most frequently occurred symptoms of anxiety and depression included fear, anxiety. Inability to relax (Table 2.). The reduction of emotional well-being is related to the absence of pleasure from previous entertainments. Over the fourth of the patients noted inability to appropriately react to certain life situations. After 6 months post the conduct of RFA, the significant reduction of patients with the symptoms of anxiety and depression was observed.

Table 2. – Frequency of occurrence of anxiety-depressive symptoms in patients with AVNRT

Parameters	Before RFA, n=33		After 6 months, n=33		p
	Abs.	%	Abs.	%	
Feeling of tension, fear and anxiety	31	93,9	22	66,7	0,01
Absence of vigor, inability to relax	30	90,9	20	60,6	0,01
Absence of pleasure from previous entertainments	29	87,9	16	48,5	0,002
Inability to appropriately react to any events and circumstances	9	27,3	2	6,1	0,05
Decrease of personal qualities	26	78,8	17	51,5	0,04

Thus, the application of RFA in AVNRT contributes to complete recovery and the patient does not have the need to continue anti-arrhythmia medicine, which leads to normalization of psychical status of patients (decrease of the feeling of anxiety/depression in 84,8%/93,9% respectively).

References:

1. Абдуллаева Т. И. Психологическая реабилитация инвалидов, больных ишемической болезнью сердца//Медико-социальная экспертиза и реабилитация. – 2001. – № 3. – С. – 13–17.
2. Ардашев А. В. Клиническая аритмология. – М., – 2009. – С 742–794.
3. Ардашев В. Н., Ардашев А. В., Лечение нарушений сердечного ритма. – М.: Медпрактика, – 2005. – 240 с.
4. Бокерия Л. А., Ревишвили А. Ш., Ардашев А. В. и др. Желудочковые аритмии. – Москва: Медпрактика. – 2002. – С. 272.
5. Гоштаутас А., Шинкарева Л., Густайнене Л.И др. Эффективность мероприятий по ранней психологической реабилитации больных ишемической болезнью сердца//Кардиология. – 2004. – № 7. – С. 35–39.
6. Кручина Т. К., Егоров Д. Ф., Татарский Б. А. Феномен и синдром Вольфа – Паркинсона – Уайта у детей: клинико-электрофизиологические различия//Вестник аритмологии. – 2011. – № 66. – С. 13–18.
7. Погосова Г. В. Признание значимости психоэмоционального стресса в качестве сердечно-сосудистого фактора риска первого порядка//Кардиология. – 2007. – № 2. – С. 65–72.

8. Скурихина О. Н., Миллер О. Н. Уровень тревоги и депрессии у пациентов с пароксизмальной и постоянной формами фибрилляции предсердий//Вестник аритмологии. – 2009. – № 55. – С. 14–18.
9. Стеклов В. И. Тахиаритмии сердца: стратегия диагностики, лечения и новые подходы к военно-врачебной экспертизе после радиочастотной аблации: автореф. дис. … докт. мед. наук. – 2015. – 47 с.
10. Химий О. В., Желяков Е. Г., Конев А. В., Ардашев А. В. Рецидив типичной атриовентрикулярной узловой реципрокной тахикардии через 8 лет после радиочастотной катетерной абляции медленной части атриовентрикулярного соединения//Клиническая практика. – 2013. – № 3. – С. 44–48.
11. Чазов Е. И., Оганов Р. Г., Погосова Г. В. и др. Клинико-эпидемиологическая программа изучения депрессии в кардиологической практике: у больных артериальной гипертонией и ишемической болезнью сердца (КООРДИНАТА): результаты многоцентрового исследования//Кардиология. – 2007. – №.5 – С. 28–37.
12. Aliot E., Stevenson W., Almendra-Garrote J. et al. EHRA//HRS expert consensus on catheter ablation of ventricular arrhythmias//Europace. – 2009. – Vol.11. – P.771–817.
13. Blomstrom-Lundqvist C., Scheinman M., Allot E. Task Force Members ESC Committee for Practice Guidelines Members ACC/AHA/ESC Guidelines for the Management of Patients With Supraventricular Arrhythmias – Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the European Society of Cardiology Committee for Practice Guidelines (Writing Committee to Develop Guidelines for the Management of Patients With Supraventricular Arrhythmias)//Circulation. – 2003. – Vol. 108. – P.1871–1909.
14. Erkaboev Sh., Amirkulov B., Kurbanov R. Effect of radiofrequency catheter ablation on quality of life in patients with atrioventricular nodal reentrant tachycardia//Medical and Health Science Journal. – 2013. – Vol.14, Issue3. – P. 128–134.
15. Orejarena L., Vidaillet H., DeStefano F. et al. Paroxysmal supraventricular tachycardia in the general population//J Am Coll Cardiol. – 1998. – Vol.31. – P.150–157.

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Effect on the experimental hypothyroidism morphological and morphometric parameters of thymus

Abstract: The aim of the work was to study the morphological and morphometric characteristics of the thymus at experimental hypothyroidism in adolescencerats. Experiments were carried out on rats weighing 70–80 g, hypothyroidism caused by adding food merkazolil in dose 0.5 mg/100 gbody weight for 14 days. Then the animals received during the month maintenance dose of the drug 0.25 mg/100 g body weight. Thymus was examined using morphological and morphometric techniques. It was found that long-term hypothyroidism contributes to a significant reduction in the area of cortical areas and a decrease in the density and ofthe mitotic activity of thymocytes. The degree of destruction of thymocytes significantly increases. Conclusion: Experimental hypothyroidism in the adolescence rats leads to inhibition of proliferation of thymocytes and increases their death in the thymus. Therefore, thyroid hormones play a key role in maintaining tissue homeostasis in the thymus in a postnatal ontogenesis.

Keywords: thymus, thyroid gland, Mercazolilum, thymocytes.

The urgency of the problem. In the process of evolutionary development of the organism there are new coordination mechanisms, leading to the formation of structural and functional relationships. These relationships enable the integration of the various organs and systems. The close relationship between the immune and endocrine systems is shown in several studies [1]. It has been established that various endocrine organs lesions are accompanied by certain immune changes in the body and, in turn, certain immune disorders lead to disturbances of the endocrine functions of the body [2; 3]. In this regard, the relationship of the thyroid with the immune system are particularly noteworthy. Clinical observations suggest that at the diseases of the thyroid gland in patients with various immune disorders develop, the severity of which depends on the level of thyroid hormones [4].

It was revealed that in patients with autoimmune thyroiditis in combination with hypothyroidism secondary immunode ficiencies are observed to varying degrees [5]. The change in the immune system generally correspond to the level of serum thyroid hormones. Reducing the level of thyroxine (T4) and triiodothyronine (T3), often accompanied by a decrease in the total amount of co-lymphocytes change in the ratio of T-suppressor/helper, a violation of antibody processes and the emergence of high-titer auto-antibodies [6; 7].

Objective. Identification of morphological and morphometric characteristics of the thymus in rats with experimental hypothyroidism caused in the prepubescent period.

Material and methods. The experiments were conducted on rats — males weighing 70–80 grams, which corresponded to the period of prepubescent or adolescent development. Rats were divided into three groups. Two groups of animals received the experimental diet Mercazolilum together with a dose of 0.5 mg. 100 gr. of body weight during the 14 days, then received within a month merkazolila maintenance dose of 0.25 mg. Per 100 g body weight. Further experimental groups of animals were divided into two subgroups. The first subgroup continued to receive merkozolil (short-term hypothyroidism). This class was used for the study of the natural regression of hypothyroidism in the juvenile period. Animals with similar body weight merkozolila instead received sterile

physiological saline throughout the experiment served as control. At the end of experiments 90 hours as control and experimental animals were killed by decapitation under light ether anesthesia. We determine the mass of the thymus and its relation to body weight. Morphological studies were conducted on 7–10 micron thick sections stained with hematoxylin and eosin. In addition, sections of the thymus morphometric method determines the average area of the lobules, their cortical and brain areas, counted the number of mitotically dividing and destructive thymocytes. All digital data is processed by the method of variation statistics using computer software package, reliable differences were considered satisfying P <0.05. For electron microscopic examination of the thymus pieces were fixed in 2.5% glutaraldehyde solution and focused in 1% solution of osmium tetroxide. After dehydration in alcohols of increasing concentration bits embedded in Araldite. Ultrathin sections were obtained on ultramicrotome LKB-V, after double staining with uranyl acetate and lead citrate viewed under an electron microscope JEM-100SX.

Results and its discussion. It was found that the thymus morphological changes in experimental hypothyroidism are directly dependent on the duration of thyroid suppression. The development of hypothyroidism in experimental animals has been proven to study serum tireoidnyhgormonov. The greatest reduction of thyroxine (T4) and triiodothyronine (T3) (more than 3-fold) was observed in rats with long hypothyroidism, and observed under short hypothyroidism relatively moderate (1.6-fold) decrease of thyroid hormones in comparison with control. Mass, as well as the index of thymus weight in both groups of experimental animals decreased compared with the control significantly. The greatest decrease in thymus weight observed in the group of rats with a long hypothyroidism. Results of morphological studies of different areas of the thymus zones are shown in table 1.

Table 1. – Average square lobes, areas of cortical and cerebral zones of the thymus at Experimental hypothyroidism (M ± m, $\times 10^5$ mm^2)

Animal group	Area				
	The total area of cloves	crustal zone		brain area	
		max.	%	max.	%.
Control (n=22)	21,5±0,6	15,9±0,2	74	5,6±0,1	26
Short-term hypothy-roidism (n=16)	19,7±0,3*	12,4±0,3***	63	7,3±0,2***	37
Prolonged hypothy- roidism (n=18)	118,5±0,5***	11,1±0,2***	60	7,4±0,2***	40

*Note: * – the difference relative to the control group significant data (* – P <0,05, *** – P <0,001)*

It is seen that hypothyroidism resulted in a significant decrease in the average area of slices. These animals with long hypothyroidism in the exponent decreased by 14% of control.

Table 2. – The average density of the cells in the lobules of the thymus location at Experimental hypothyroidism (M ± m, $\times 10^5$ mkm^2)

Animal group	Area	
	crustal zone	brain area
Control (n=22)	19,1±0,28	9,7±0,17
Short-term hypothy-roidism (n=16)	17,8±0,31**	8,9±0,23**
Prolonged hypothy- roidism (n=18)	16,5±0,27***^^^	8,6±0,22***

Note: — the difference relative to the control group significant data (** — P <0,01, *** — P <0,001), ^ — differences with respect to short-term data giaotireoz significant (^^^ — P <0,001)*

In separate research areas of different zones revealed that hypothyroidism contributed to a significant reduction in the area of cortical areas on 22–30% of the control. In contrast, the brain area with hypothyroidism area increased by 30–32% of the control. Both short and long-term hypothyroidism resulted in a decrease in the average cell arrangement density in areas of thymic lobules (table 2).

The cell density in the cortical area, depending on the duration of hypothyroidism decreased by 7–13,7%, and in the brain area — on 8,3–11,4% of the control. It is found that reducing the concentration of thyroid hormone adversely affects thymocyte proliferation activity, while increasing the degree of destruction of thymus cells (table 3).

Table 3. – Number of mitotically dividing and destructive thymus cells in experimental hypothyroidism (M ± m 10^3 cells)

Animal group	Cells			
	mitotic		destructive	
	cortical	brain	cortical	brain
Control (n=22)	52,8±1,5	10,2±1,3	16,5±1,2	4,8±0,3
Short-term hypo-thy-roidism (n=16)	43,4±1,3***	8,6±0,9	27,8±1,4***	8,7±0,5***
Prolonged hypothy- roidism (n=18)	21,7±1,1***	5,4±1,2**	48,3±1,6***	10,5±0,9***

As the table shows, the largest decrease in the mitotic activity of thymus cells is observed for prolonged hypothyroidism. The number of mitoses in these animals in the cortical and medullary zones was respectively of 41% and 53% of control. For short hypothyroidism decrease the number of mitoses were not so pronounced and the number of proliferating cells in this case was 82–87% of control. Reducing the number of mitosis in hypothyroidism accompanied with an increase in the number of cells in the areas of destructive thymus. Table 3 shows that the greatest increase in the amount of degradation observed in the cortical area in which intermittent 1.77 hypothyroidism, and prolonged hypothyroidism — 2.9 times the control parameters. Similarly, but

to a lesser extent, increased the degree of destruction in the brain area. The most pronounced morphological and submicroscopic thymus changes occurred in rats with long hypothyroidism. In the majority of cortical slices zone acquires the character of a narrow strip, where portions of closely spaced thymocytes interspersed with light areas that do not contain cells.

The cortical area is often identified large bright pockets containing destructive thymocytes. Hypothyroidism, especially long, accompanied by a significant ultra-structural changes of thymocyte and thymic microenvironment cells. Often identified with signs of thymocytes lysis of the cytoplasm and nucleus pyknosis. Macrophages thymus were characterized by large size, in their cytoplasm often phagocytized thymocytes were found in various stages of destruction.

All this indicated that under the conditions of thyroid hormone deficiency is amplified degree of degradation and death of thymocytes, macrophages are absorbed rapidly. So, conducted studies have shown a direct correlation with postnatal growth of the thymus thyroid condition. We have found that the longer the duration of hypothyroidism, the deeper manifested morphological and morphometric changes in the thymus. Status of the thymus in a violation of thyroid function has been insufficiently studied. In the works of Ukrainian authors demonstrated that the removal of the thyroid gland is accompanied by inhibition of the secretory activity of the thymus in terms of production of thymic hormones. It is known that these hormones are key regulators of the process of proliferation and differentiation of T lymphocytes and their subpopulations. From our data show that at short hypothyroidism, hypothyroidism and long — lead to a greater extent to decrease the proliferative activity of thymocytes. The degree of degradation is significantly increased in the thymus. This, in turn, contributes to thymic hypoplasia as to reduce its weight and performance of different zones of the thymus lobes. The development of premature thymic involution can be attributed to deficiency of thyroid hormones that have a regulating influence-of the synthesis and secretion of thymic peptides. It is possible that in the pathogenesis of structural and functional disorders of the thymus in a hypothetical-reoza important role played by thyroid and growth hormone anterior pituitary, and thyrotropin-releasing hormone produced by the hypothalamus. From here, it follows that for the natural formation and functioning of the thymus is necessary to have normal levels of thyroid hormones. Prevention of hypothyroidism in childhood and adolescence is one of the important conditions for the normal functioning of the immune system in the adult body.

Conclusions

1. Hypothyroidism develops in the prepubescent period, leading to hypoplastic thymus, the degree of which depends on the duration of the hypothyroid state.

2. Inhibition of activity of the thyroid gland reduces the proliferative processes in the thymus and increases the degradation of thymocytes that entails a violation of the processes of T-lymphocytopoiesis in the body.

References:

1. Akmaev I. G. Modern ideas about the interactions of regulatory systems: the nervous, endocrine and immune//Phys. Fiziol. Sciences. – 1996. – Vol. 27, No 1. – P. 3–20.
2. Bolyutskaya L. A., Mars T. P. Clinical and immunological characteristics of patients with immune tireoditom//Immunology. – 2002. – Vol. 23, No 3. – P. 175–177.
3. Mikhailov VA The pathophysiological aspects of hypothyroidism in rats in the experiment/VY. Mikhailenko, V. A. Konplyanko, O. V. Vasilyanskaya, I. G. Postolyuk//Journal of Emergency and Reconstructive meditsiny. – 2012. – T.13 – No 1. – P.86–88.
4. Pods G. Y., Merkulova L. M., Kostrova O. Y., Mikhailov M. N., Moskvichev E. V. Morphological and immune-histochemical examination of the thymus in the normal state and after application polyoxidonium//Bulletin of the University of Chuvashia. – 2012. – No 3. – P. 525–530.
5. Popova N. M. Morphofunctional state of the thyroid gland in the appointment of simvastatin on the background of experimental hypothyroidism/N. M. Popova etc.//Ros. Mediobiol. Herald. Acad. I. P. Pavlova. – 2010. – No 4. – P. 46–51.
6. Pods G.YU., Merkulova L. M., Kostrova O., et al. Morphological and immunohistochemical examination of the thymus in the normal state and after application polyoxidonium//messenger the Chuvash University. – 2012. – No 3. – P. 525–531.
7. Yuldashev M. T. Theoretical and Clinical Medicine Features of formation cytogram thymus at short-term and long-term experimental hypothyroidism caused in prepubertal periode. – 2016 (4) – P. 25–27.

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Ultrasound examination of the carotid arteries in age-related macular degeneration

Abstract: The article is dedicated to the study of frequency of detection and degree of the severity of pathology of carotid arteries in patients with age-related macular degeneration (AMD). 70 patients with different forms of AMD were examined. Among them, there were 30 patients (50 eyes) with early manifestation of AMD; 40 patients with late manifestation: 15 pa-

tients (25 eyes) with atrophic AMD and 25 patients (40 eyes) with different forms of choroidal neovascularization. All patients underwent duplex scanning and color Doppler imaging of brachiocephalic arteries. As result of research, it was revealed that pathological twisting of internal carotid arteries occur in 48% to 64% in patients with AMD, and arterial sclerotic disease of BCA in 65% to 85%. The presented data prove that the change of blood flow in BCA as result of stenosis or pathological twisting is the factor of risk of development of AMD and confirm the important role of hemodynamic factor in the pathogenesis of this disease.

Keywords: age-related macular degeneration, carotid artery, pathological tortuosity, stenosis, duplex scanning, color Doppler imaging.

Relevance. Recently, the attention of the ophthalmologists has been drawn by eye diseases determined by chronic ischemia and hypoxia of the organ of vision, which are related to stenotic disease or pathological twisting of brachiocephalic arteries (BCA). Most authors refer age-related macular degeneration (AMD) along with other eye diseases to the manifestations of chronic eye ischemia [3, 121–125; 6, 110–131].

Currently, four fundamental theories of AMD pathogenesis are considered: primary aging of retinal pigment epithelium and Bruch's membrane, damages by the products of lipid peroxidation, primary genetic defects and pathological changes of blood flow of the eye ball [2, 106–109; 9, 413–424; 10, 430–433; 11, 473–482].

In 1937, F. H. Verhoeff and H. P. Grossman presented the information about the role of system and local vascular factors in the AMD pathogenesis for the first time. Later, the interest to this problem increased and the vascular theory took the leading place in the explanation of reasons of AMD appearance [2, 106–109; 13, 3771–3777].

Most publications are dedicated to the study of the role of atherosclerotic disease of carotid arteries and system arterial pressure in the development and progression of the AMD symptoms. Currently, it's been established that people with atherosclerosis of carotid arteries have higher risk of AMD development than in the general population; herewith, it is established that atherosclerotic disease of the arteries of other basins does not play any role in the progression of the given pathology [2, 106–109; 8, 4624–4631]. Moreover, the increased arterial pressure is not a factor of risk of AMD development, but the frequency of cases of disease increases if it is associated with stenotic diseases of carotid arteries [2, 106–109; 12, 4722–4727]. The significant role in the development of AMD is given to cardiovascular diseases. E. F. Cherney (2001) notes that in atherosclerosis, the risk of the disease of macular area increases by 3 times, and by 7 time in the presence of hypertonic disease. Atherosclerosis plaques of the common carotid increase the risk of AMD development by 2,5 times; plaques in the area of bifurcation of carotid arteries — by 4,7 times [4, 42–45; 6, 110–131]. E. S. Abdulaeva (2002), Yu. M. Lagutina (2006) registered the changes of blood flow in the system of internal carotid artery (ICA) at non-exudative forms of AMD [5, 3–22].

Thus, presented literature data indicates that the change of blood flow in the carotid arteries as result of occlusions, stenosis or pathological twisting leads to the disorder of local eye blood flow and is a factor of risk for the development of vascular pathology of the eye and AMD symptoms. However, the questions about the frequency of occurrence of BCA disorders and their peculiarities — character and degree of expressiveness of pathologies depending on the clinical form of AMD, remain open.

Aim. To study the condition of blood flow and evaluate the degree of expressiveness, frequency of detection of pathological changes of brachiocephalic arteries in patients with different clinical forms of age-related macular degeneration.

Materials and methods. 70 patients with different forms of AMD aged from 50 to 85 (65,5±5,8 years old) were examined. Among them, there were 30 patients (50 eyes) with early manifestation of AMD (hard and soft drusen, defect and migration of pigment epithelium of retina); 40 patients with late manifestation: 15 patients (25 eyes) with atrophic AMD and 25 patients (40 eyes) with different forms of choroidal neovascularization (CNV).

The criteria of exclusion of patients from the study included:

1) any form of glaucoma;

2) impossibility of ophthalmoscopy (cicatricle opacity of cornea, cataract, consequences of uveitis);

3) presence of detached retina;

4) presence of thrombosis of the central vein or obstruction of the central artery of retina;

5) presence of diabetic retinopathy of any stage;

6) presence of myopia of high degree with long anterior-posterior axis of the eye ball over 26 mm;

7) presence of intra-cranial damage of optic tract and disease of optic nerve;

8) presence of diabetes in the stage of decompensation;

9) presence of oncological diseases;

10) presence of psychical diseases, including alcoholism.

It should be noted that in the work, every examined eye was accepted as a separate clinical case of disease and, in further presented material, we factually considered not as much the number of patients as the number of eyes affected with ADM and BCA from same-name side.

The control group included 15 volunteers comparable in age and sex without the signs of AMD.

All groups were statistically homogenous and comparable according to the presence, severity and character of co-existing details. Among general diseases, the examined patients were most often diagnosed with arterial hypertension, hypertonic disease, ischemic heart disease, type I and II diabetes, chronic disorders of cerebral circulation, circulatory encephalopathy. The diagnosis and treatment of common diseases were established by the specialists: therapist, cardiologist, endocrinologist and neurologist.

Apart from the standard common ophthalmological examination, all patients underwent duplex scanning and color Doppler imaging (CDI) with the use of multi-functional ultrasound diagnostics device SonoAce R7 (SAMSUNG MEDISON CO., LTD., Republic of Korea) with the use of linear detector with frequency 7 MHz to evaluate the condition of the blood flow in BCA. The specter of the Doppler shift of frequencies was registered and main quantitative and qualitative parameters of blood flow were defined. The detector was placed over the jugular notch in parallel to the internal edge of sternocleidomastoid muscle. Changing the inclination of the detector to the surface of the neck, clear visualization of the mouth of the common carotid artery (CCA) was received. The sinus of CCA and its bifurcation were located behind the corner of the lower jaw; during the examination of ICA, the detector was turned in the lateral direction. During the visual evaluation of the vascular bed, the vascular permeability (permeable, obstructed), flow direction (presence of deformations — bends, twists, loop formations), di-

ameter of the vessel (normal, reduced, increased), movability of the vascular wall (rigidity, hyper pulsation), condition of perivascular tissues (density, presence of various pathological formations) were taken into account. The luminal occlusion of uniform diameter is lower than echogenicity of the surrounding tissues; the internal surface of the intima. The thickness of the complex intima-media is not more than 1 mm in normal state.

The degree of the expressiveness of stenosis of carotid arteries was established according to the classification of the European association of carotid surgery (1991): 1) small stenosis — 0–29%; 2) moderate stenosis — 30–49%; 3) expressed stenosis — 50–69%; 4) critical stenosis — 70–99%; 5) occlusion — 100% [7, 1478–1480].

The pathological twisting of ICA was assessed according to the form of elongation: C and S-shaped twisting, bends at sharp points (kinking), loop and spiral shaped twisting (coiling), double bends and combined twisting.

According to the hemodynamic characteristics of blood flow in ICA, hemodynamically significant and hemodynamically insignificant violations were distinguished. According to the generally accepted classification of stenosis of carotid arteries, the degree of stenosis over 60% was considered hemodynamically significant [1, 25–54]. The criteria of hemodynamic significance of pathological twisting of ICA were:

1) gradient of peak systolic velocity of blood flow between proximal and distal sites of the vessel relative to the place of twisting with the reduction of velocity in distal direction by 20% and more;

2) growth of peak velocity in the place of angulation compared with the proximal site of BCA by 30% and more;

3) disorganization of blood flow in the zone of twisting manifested in the increase of spectral expansion and disruption of color pattern of blood flow in CDI regime.

The obtained data was subjected to statistical processing with the help of the program Statistica 6,0. The quantitative indicators were processed by the methods of descriptive statistics and presented in the form of the arithmetical mean and its standard error (M±m). Absolute number and relative value in percentage (%) were indicated for the indicators characterized by qualitative signs. The criterion of Kolmogorov-Smirnov was used to check the hypothesis of normality of distribution of quantitative indicators. In the vent of deviation from normal distribution, Mann-Whitney U-test was used to compare data. Student t-criterion was used in the event of correspondence of data to the normal distribution. Achieved level of significance (p) was calculated in all procedures of statistical analysis, herewith, the critical level of significance in this study was equal 0,05. Relative risk of effect was evaluated according to odd ratio (OR). To check statistical hypotheses about differences of absolute and relative frequencies, shares and relations in two independent selections, χ^2 criterion was used with the Yate's correction with regard to continuity. Confidence intervals (CI) presented in the work were built for confidence probability p=95%.

Results and discussion. As result of ultrasound examination of ICA in patients with initial manifestation of AMD, 48% of cases showed different forms of deformations of vessels without signs of hemodynamically significant acceleration of blood flow (Table 1). Out of which, C-shaped pathological twisting of artery was noted in 22% of cases and S-shaped pathological twisting — in 18% of cases. Moreover, the kinking twisting was revealed in 6% of cases and coiling twisting — in 2%. In the group of patients with geographical atrophy of pigment epithelium of retina (PER), pathological twisting of ICA was observed in 64% of patients. Among them, 28% had C-shaped twisting, 20% — S-shaped twisting, 8% — kinking and 4% — coiling, and 4% had double bends. In the group with neo-vascular AMD, pathological twisting of ICA was diagnosed in 60% of cases. Among them, 25% of cases had C-shaped twisting of the vessel, 20% — S-shaped twisting, 10% — kinking and 5% — coiling. The correlation of chances of occurrence of pathological twisting of ICA in patients with AMD was established most in the group with geographic atrophy PER — by 3,1 times compared with the control group; in the group with neo-vascular AMD, this indicator was 2,86 and in the group with early manifestations of AMD — 1,6.

Table 1. – Frequency of occurrence of pathological twisting of ICA in patients with different clinical forms of AMD

Form of PT	Early manifestation of AMD (n=50)		Geographic atrophy PER (n=25)		Neo-vascular AMD (n=40)		Control group (n=30)	
	Number of cases	%	Number of cases	%	Number of cases	%	Number of cases	%
C-shaped	11	22,0	7	28,0	10	25,0	5	16,7
S-shaped	9	18,0	5	20,0	8	20,0	3	10,0
Kinking	3	6,0	2	8,0	4	10,0	2	6,7
Coiling	1	2,0	1	4,0	2	5,0	1	3,3
Double bedns	–	0,0	1	4,0	–	0,0	–	0,0
Total	24	48,0	16	64,0	24	60,0	11	36,7
χ^2; p*	0,57; 0,45		3,06; 0,08		2,86; 0,09		–	
OR** (95% CI)	1,6 (0,63–4,03)		3,1 (1,02–9,26)		2,6 (0,98–6,87)		–	

*Remark: * – level of significance of differences compared with the data of control group*

*** – correlation of chances to the data of control group*

Table 2. – Frequency and degree of stenosis of CCA in patients with different clinical forms of AD

Degree of stenosis	Early manifestation of AMD (n=50)		Geographic atrophy PER (n=25)		Neo-vascular AMD (n=40)		Control group (n=30)	
	Number of cases	%	Number of cases	%	Number of cases	%	Number of cases	%
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
No stenosis	12	24,0	3	12,0	6	15,0	11	36,7
Small stenosis	21	42,0	5	20,0	9	22,5	9	30,0

1	2	3	4	5	6	7	8	9
Moderate stenosis	17	34,0	17	68,0	25	62,5	10	33,3
Total with stenosis	38	76,0	22	88,0	34	85,0	19	63,3
χ^2; p*	0,91; 0,34		3,17; 0,07		3,28; 0,07		–	
OR** (95% CI)	1,8 (0,68–4,91)		4,2 (1,03–17,5)		3,3 (1,05–10,3)		–	

*Remark: * – level of significance of differences compared with the data of control group*
*** – correlation of chances to the data of control group*

Table 3. – Frequency and degree of stenosis of ICA in patients with different clinical forms of AMD

Degree of stenosis	Early manifestation of AMD (n=50)		Geographic atrophy PER (n=25)		Neo-vascular AMD (n=40)		Control group (n=30)	
	Number of cases	%	Number of cases	%	Number of cases	%	Number of cases	%
No stenosis	24	48,0	8	32,0	14	35,0	18	60,0
Small stenosis	12	24,0	7	28,0	10	25,0	5	16,7
Moderate stenosis	14	28,0	10	40,0	16	40,0	7	23,3
Total with stenosis	26	52,0	17	68,0	26	65,0	12	40,0
χ^2; p*	0,65; 0,42		3,24; 0,07		3,37; 0,07		–	
OR** (95% CI)	1,6 (0,65–4,07)		3,2 (1,05–9,70)		2,8 (1,05–7,40)		–	

*Remark: * – level of significance of differences compared with the data of control group*
*** – correlation of chances to the data of control group*

Thus, the results of examination of ICA in patients with different clinical forms of AMD showed that from 48% to 64% of cases had pathological twisting of this or that form. It should be noted that with the severity of the course of dystrophy of macular zone, the growth of frequency of detection of pathological twisting of ICA is noted.

According to the data of ultrasound studies of BCA in patients with early manifestations of AMD, stenosis of CCA was diagnosed in 76%, out of which, 42% — small stenosis and 34% — moderate stenosis (Table 2). More significant differences compared with the control group were revealed in patients with late manifestations of AMD: in the group with geographic atrophy PER — 88% (20% small and 68% moderate stenosis), in the group with neo-vascular AMD — 85% (22,5% small and 62,5% moderate stenosis).

The stenosis of BCA was detected in small degree compared with the stenosis of CCA (Table 3). Thus, in the group with early manifestations of AMD, 52% of patients are observed, and in the group with geographic atrophy PER — 68%; in the group of patients with neo-vascular AMD — 65%. It should be noted that more than half of cases had moderate stenosis.

Thus, the results of ultrasound study of the condition of ICA showed that with the progression of dystrophic process, from initial manifestations to atrophy PER. There is a tendency towards the increase of frequency of detection and degree of stenosis.

Table 4. – Indicators of the ultrasound study of CCA and ICA in patients with different clinical forms of AMD; (M±m)

Parameters	Early manifestation of AMD (n=50)	Geographic atrophy PER (n=25)	Neo-vascular AMD (n=40)	Control group (n=30)
CCA				
Vs (cm/s)	60,2±3,4	45,8±3,4*	52,8±3,8	58,5±4,2
Vd (cm/s)	17,9±1,8	15,6±1,5	16,5±1,4	20,4±1,9
RI	0,69±0,06	0,79±0,06	0,77±0,03	0,62±0,06
Degree of stenosis (%)	27,8±2,1	32,1±1,7**	31,5±1,8*	25,5±1,7
CIM (mm)	1,28±0,04	1,39±0,05*	1,36±0,05*	1,21±0,05
ICA				
Vs (cm/s)	59,1±2,3	49,8±3,5*	51,6±3,7	61,2±4,1
Vd (cm/s)	24,6±1,7	21,6±1,4	22,3±1,3	25,1±1,6
RI	0,72±0,07	0,78±0,05	0,76±0,04	0,69±0,05
Degree of stenosis (%)	25,8±1,8	29,4±1,6**	28,5±1,9*	22,5±1,8
CIM (mm)	1,25±0,06	1,37±0,06*	1,34±0,05*	1,18±0,06

*Remark: * – level of significance compared with the data of control group (p<0,05)*
*** – level of significance of differences compared with the data of control group (p<0,01)*

Duplex examination of the condition of blood flow in ICA in patients with AMD showed the decrease of velocity parameters of blood flow in different degree and increase of the complex of intima-media (CIM) compared with age-related norm (Table 4). Compared with age-related norm, significant reduction of velocity of blood flow and increase of the complex of intima-media (p<0,05 or p<0,01) was noted in patients with late manifestation of AMD, which certified about atherosclerotic changes of vascular wall. In the group with early manifestations of AMD, the reduction of hemodynamic indicators of blood flow of ICA compared to the norm was present in all cases; herewith, we didn't detect statistically significant changes.

Thus, most examined patients had pathological twisting of ICA and atherosclerotic damage of BCA. Possibly, this leads to the disor-

der of blood circulation in eye vessels due to the reduction of elasticity of vascular wall determined by age-related changes as well as because of hemodynamic load at the increase of arterial pressure and combination of age-related changes in arteries with changes of the condition of blood flow. The high percentage of cases (48–64%) of pathological twisting of ICA and (52–85%) atherosclerotic damage of BCA in examined patients indicates the significance of this factor in the pathogenesis of AMD.

Conclusions

1. The presented data prove that the change of blood flow in BCA as result of stenosis or pathological twisting is the factor of risk of development of AMD and confirm the important role of hemodynamic factor in the pathogenesis of this disease.

2. The frequencies of occurrence of pathological twisting of ICA in patients with different forms of AMD were revealed: with early manifestations of the disease — in 48% of cases, in patients with geographic atrophy PER — in 64% of cases, in patients with neo-vascular AMD — 60%.

3. Peculiarities of pathological twisting of ICA in AMD was revealed: C-shaped twisting occurs in 25% of cases; S-shaped twisting — in 19% of cases; kinking — in 19%, coiling — in 3,5% and double bends in 1,5% of patients.

4. Atherosclerotic disease f CCA and ICA in patients with AMD occurs in 85% and 65% respectively; herewith, there is a tendency towards the increase of the frequency of occurrence of damage and degree of stenosis with the progress of dystrophic process.

5. Moderate stenosis of CCA and ICA occurs in 34% and 28% of cases, in early manifestations of AMD, in 62,5% and 40% in neovascular, 68% and 40% in geographic atrophy PER.

6. The degree of stenosis of BCA in geographic atrophy PER and neo-vascular AMD reaches significant level compared with the group of control and early manifestations of AMD.

References:

1. Бокерия Л. А., Суханов С. Г., Катков А. И., Пирцхалаишвили. Хирургия патологической извитости брахиоцефальных артерий. – Пермь: Курсив. – 2006; – 144.
2. Гавриленко А. В., Куклин А. В., Киселева Т. Н., Фомичева И И., Власов С. К. Патологическая извитость сонных артерий как фактор риска возрастной макулярной дегенерации. Ангиология и сосудистая хирургия. – 2009; – 15:106–109.
3. Денисова И. П., Кузнецов С. Л., Бражалович Е. Е. Клинико-патологические корреляции ишемической и инволюционной патологии глаз у пациентов с гемодинамически значимым стенотическим поражением брахиоцефальных сосудов. Медицинский вестник Башкортостана. – 2014; – 9 (2): – 121–125.
4. Егоров Е. А., Романенко И. А. Возрастная макулярная дегенерация. Вопросы патогенеза, диагностики и лечения. Клиническая офтальмология. – 2009. – 10 (1): – 42–45.
5. Лагутина Ю. М. Ультразвуковые методы диагностики нарушений кровотока в сосудах глаза, брахиоцефальных артериях и медикаментозная коррекция при неэкссудативной возрастной макулярной дегенерации. Автореф. дис. … канд. мед. наук. – М. – 2006. – 22.
6. Тарасова Л. Н., Киселева Т. Н., Фокин А. А. Глазной ишемический синдром. – М.: Медицина. – 2003. – 176.
7. Barkana Y., Harris A., Hefez L., Zaritski M., Chen D., Avni I. Unrecordable pulsatile ocular blood flow may signify severe stenosis of the ipsilateral internal carotid artery. British Journal of Ophthalmology. – 2003. – 87:1478–1480.
8. Beirne R. O., Hogg R. E., Stevenson M. R., Zlatkova M. B., Chakravarthy U., Anderson R. S. Severity staging by early features of age-related maculopathy exhibits weak relationships with functional deficits on SWS grating acuity. Investigative Ophthalmology and Visual Science. – 2006; – 47:4624–4631.
9. Bonilha V. L. Age and disease-related structural changes in the retinal pigment epithelium. Clin. Ophthalmol. – 2008; – 2 (2):413–424.
10. Cheung N., Liao D., Islam F. M. A., Klein R., Wang J. J., Wong T. Y. Is early age-related macular degeneration related to carotid artery stiffness? The atherosclerosis risk in communities' study. British Journal of Ophthalmology. – 2007; – 91:430–433.
11. Ehrlich R., Harris A., Kheradiya N. S., Winston D. M., Ciulla T. A., Wirostko B. Age-related macular degeneration and the aging eye. Clinical Interventions in Aging. – 2008; – 3 (3): 473–482.
12. Feig B., Brown B., Lovie-Kitchin J., Swann P. Adaptation responses in early age-related maculopathy. Investigative Ophthalmology and Visual Science. – 2005; – 46: 4722–4727.
13. Redmer van Leeuwen, Kamran Ikram M., Johannes R. Vingerling, Jacqueline C. M. Witteman, Albert Hofman, Paulus T. V. M. de Jong. Blood Pressure, Atherosclerosis, and the Incidence of Age-Related Maculopathy: The Rotterdam Study. Investigative Ophthalmology and Visual Science. – 2003; – 44: 3771–3777.

Section 7. Pedagogy

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Conceptual aspects of the creation of competitive education system in Uzbekistan

Abstract: The article discusses the problems of modernization of higher education in Uzbekistan in the context of the Bologna Declaration. Comparative analyzes of the education system in Europe and Uzbekistan. Shown are methods systematic and comprehensive solutions to the problem.

Keywords: Conceptual aspects, competitive education, the Bologna Process, modernization, higher education, Bachelor, Master, Engineering.

The increasing globalization of information, science and industry, require education, of preparation a wide profile specialists with extensive skills and communication skills, able to switch from one activity to another. The national education system of the Republic of Uzbekistan is reformed, as a rule, by raising the of learning capacitance, which is associated with an increase in spending on education and decrease in the quality of education. These requirements can be implemented only with the introduction of the principle of continuity of education, continues for the whole of human life. The adoption of this basic position requires a fundamental change in the national higher education system and the introduction of multilevel improvement of qualification of specialist.

In Uzbekistan, the modernization of the education sector carried out in stages, beginning of independence. However, the progress of the national personnel training programs in higher education institutions takes place unequal least, professors and academic staff are not fully planned program of modernization of higher education in the country. Among the reasons for lack of dissemination of the law on education, national training programs and other public acts are conservative, lack of information, disbelief in the final positive outcome and disinterest of professors and academic staff.

Modern education reform in Uzbekistan has its own characteristics associated with the specifics of external and internal conditions. Social, scientific, technical, economic, cultural and political environment in which the functions higher education institutions and creates special prerequisites for further development. In my opinion in the higher education of Uzbekistan carried out serious reforms, the content of which is considerably wider than the changes that the Bologna Process envisages.

Uzbekistan produces its national policy in the sphere of higher education, based on the internal needs of the country and taking into account world tendencies. In accordance with the tasks carried purposeful work, created government system of quality control and accreditation of higher education institutions [1; 2].

Uzbekistan's transition to a three-level system of personnel training (4 years Bachelor's, Master's 2 years and 3 years Institute senior researchers) suggests that access to the second and third cycles will require the successful completion of the first cycle lasting at least four years. In terms of qualification degree awarded after the first cycle shall comply with the requirements of the world labor market. The second cycles is completed get a master's, and then third cycle a PhD.

Moreover goes detailed dialogue on issues of rapprochement to the European education system. It should be noted that currently the European education is no uniform system, there are many schemes of education. Comparisons of the conceptual provisions of the modernization of higher education in Uzbekistan have shown that there is no radical conflict with the European educational system. The main assertions of development of education in Uzbekistan formulated orientation of education to a person in the implementation of the principle of humanity education. The main state acts adopted on education, personality is considered as the aim of education and the education model — as the movement for perfection humans. The national model of education that envisages for human development during all life need to the initial a universal, a fundamental, and not narrowly specialized education.

Underscoring higher education as a public good, in the national program for the personnel training is marked the unity of its political, social and economic sides as state guarantees access to education. This document also is viewed the position that students should be provided with appropriate conditions for work and life, so that they can successfully and timely completed their studies without reference to the circumstances related to their socio-economic status.

"Law on education" of the Republic of Uzbekistan also emphasizes the need the autonomy of higher education institutions, while ensuring of liability. Autonomy is viewed in the transfer of educational institutions of moderate autonomy and the possibility attraction of extra budgetary funds in education. This is guideline

that provides improve the social status and professionalism education personnel and development of education as an open state and social system in the conditions of strengthening government and public support [1; 2].

At the same time, in conditions of mass access to higher education, ensuring modern quality becomes a fundamental problem. This is the main point, which is why was required the modernization of the education system in the Republic of Uzbekistan. Today, we can state that education institutions let out an average of specialists of different levels of quality of education. This problem requires the introduction of tiered of education and qualification gradualness of receiving learners that will improve the quality of education.

The fundamental nature of education — one of the priorities of the national education system, is the foundation of education quality assurance. The fundamental today is the basis of professional flexibility, conforms to the requirements constantly changing of the modern market.

The carried out analyzes in the framework of the project «HIGHVEC» showed that the overall education of Uzbekistan and the European educational system are consistent, then problems arise in subsection the development of of the upper mechanisms of implementing this program, taking into account the interests of all parties. There are incomprehensible, possibly disturbing moments, between the considered the key provisions and the existing practice.

One of the main objectives of the Bologna process is the involvement to Europe a large number of students from other regions of the world [3]. It is believed that the introduction of a pan-European system of quality assurance of education, credit accumulation system, of easily readable qualifications will lead to the fact that the involvement of Uzbekistan in the world pyramid of educational business will increase the outflow of students to other countries. It must be admitted that such a situation exists in the present, and by force, cannot be stopped. It may be solved through creating a competitive education system of attractive also for other countries.

One of the difficult problems to be solved is a different system for monitoring and evaluation of students' knowledge, for example, in Uzbekistan the rating system of monitoring and evaluation, and credit in Europe. Also in Uzbekistan remains problematic placement of bachelors. When employing employer should pay attention to the competencies that indicated in this qualification, that is, what the functional responsibilities should perform the work searcher.

In the current two-tier system of bachelor students in the first two years of studying at a higher education institution for a fairly general program, At the beginning they study the subjects included in the humanitarian and socio-economic, mathematical and natural-science and general professional cycles. In the second two years of study disciplines included in the general professional, special and additional cycles. Two-tier training system is not conceptually different from the European, but at the same time, baccalaureate, is regarded as the formal level of education in the labor market, and the Masters is regarded as an opportunity to increase the of terms of preparation for the specialty.

In Europe, there are two different lines of technical education, namely:

– a longer, it provides a large extent scientific-oriented education;

– a shorter, which provides a large extent practically oriented education.

These types of training direction terminating in two kinds of engineering profile — the so called conceptual engineers and practical engineers, both of profile training, good in demand the labor market.

Titles for engineers with higher education, within the meaning of the Bologna Declaration CLAIU are seen the adapted to existing titles of educational titles for engineers, as follows [4]:

– "Bachelor of Engineering", which indicates the study of the practically oriented engineer with a study of 3, 3,5 or 4 years;

– "Master of Science in Engineering", which indicates the study of the theoretically and conceptually oriented engineer with a study of 5 years.

The academic term of "Sciences" within a university background indicates that the study has a fundamental mathematical and highly scientific basis. Consequently, the addition of "Science" to a Bachelor or Master degree can only apply to those types of study which are characterised by a "Sciences" content. Consequently, the possible qualification of "Bachelor of Engineering", "Bachelor of Engineering Sciences", "Master of Engineering".

The "Bachelor of Science in Engineering" is a university intermediate phase of the conceptual engineering profile which only grants study mobility in the host country or abroad. It is not an independent, economically viable "final" degree.

The "Master of Science in Engineering" is the degree which indicates the formation of the conceptual engineer.

The "Master of Engineering" is not available now but could offer to the Bachelor of Engineering further study opportunity (1 Õ2 years) in a particular technological field [4].

The degree of "Bologna" the bachelor should be considered as part of the educational process. Although the graduate bachelor level, and may wish to enter the labor market, but he will need to additional training in order to achieve competencies possessed graduate of master's level.

As seen, baccalaureate scheme, which is implemented in Uzbekistan is different from the European version. The European the bachelor degree, the qualifications adapted to the different competences. However, they favor the formation at the bachelors general education, social and personal, economic, organizational, managerial, general scientific, professional, special competences for the free orientation on the labor market and continuing education in the future.

From the above comparative analysis can conclude the following and recommendations.

1. The state educational standards of Uzbekistan shall contain the discipline or the same modules, which would ensure:

– the competence of value-sense orientation (understanding of the values of culture, science, industry);

– the competence of citizenship (the knowledge and observance of the rights and responsibilities of citizenship, freedom, and responsibility);

– the competence of self-improvement (awareness of the need and the ability to learn throughout life);

– the competence of social interaction (the ability to use cognitive, emotional and volitional peculiarities the psychology of personality, willingness to cooperate, the racial, national, religious tolerance and ability to repay the conflict);

– the competence of communication (of oral, of written, cultural and foreign language);

– the competence of health savings (knowledge of and compliance with the rules of a healthy lifestyle).

2. All bachelor programs should include universal skills and competencies as part of the competence of the master's degree. It is recognized that in some areas that require professional accreditation, Bachelor's not always can give qualified providing full professional competence. One important task is to develop a description of core competencies that should to own of bachelor and master graduates in

broad subject areas. Since such descriptions are a means of improving the quality, flexibility and comparability of educational programs.

3. Planning of staff units should be implemented by the number of students; in stages should be reduced amount of classroom hours; work aimed at the widespread introduction of information technologies should be accelerated; further planning transfer of administrative functions to the chairs of and the announcement of the contest on the best innovative universities.

4. Modernization of education will require modification and teaching technologies. So, as a qualification of competence related to the development of personality, one of the main objectives of organization of educational process is to strengthen the role of independent work of the students. Organization of teaching in the form of teaching, ready standard of knowledge, book truths, is an informative character, is less effective in the sense of comprehensibility, inculcates consumer attitude, do not teach of thinking independently and acquire knowledge. Rational reduction of classroom teaching and shifting emphasis to independent work will contribute the development of students' ability to self-development, skills of free critical thinking.

All this leads to a change in technology training. Getting new knowledge and information derived from different sources and supervised by the teacher, will enhance the creative aspects of education. The teacher becomes a manager, consultant. Organization of independent work requires high qualification of teachers, working together with the student to solve problems and scientific issues, performing of projects and dissertations. Thus the organization of self-productive work requires a large expenses of time by the teacher. The development of new technologies, access to obtain of diverse information, provides a variety of options for the organization of independent work of students.

5. Transfer learning management to the department and to give priority to independent work of students means that the planning of the state within the profession needs to be conducted on the total number of hours recorded in the state educational standards, taking into account the time planned for students' independent work. And the work of the teacher should be assessed in all types of work: classroom, the organization of independent work of students, methodological, scientific, educational and research work of students scientific research work of students. There is no need of permanent controls over hours and determined of salary by the amount of hours spent. Accordingly, many of the structures would be superfluous. Significant efforts of training quality control structure. Responsibility and control a large load will go to the head of the chair.

Seems to us that by taking the basic provisions of the Bologna Declaration, it is necessary to stick closer to the East European scheme of development of higher education. At the same time prescribed compulsory subjects should be within 50–70% of the total amount of training, depending on the cycles envisaged by the state educational standard.

In conclusion, it should be noted that modernization of education will take place in a systematic and comprehensive solution of these problems and the implementation of the principles:

1. Modernization of education should be carried out independently of the Bologna process.

2. The principles of humanity, advanced and continuing education can be carried out most effectively when administered multilevel.

3. To integrate primary, secondary and higher education as a step in continuing education and multilevel professional training. This will require the harmonization and standardization of cross-cutting professional educational programs from primary to postgraduate.

4. It is necessary to form requirements to the level of professional qualifications required, the content and teaching techniques. Necessary to introduce integrated-differentiated approach to the compilation of the state educational standards. For example, for all engineering specialties of humanitarian and socio-economic, mathematical and natural sciences and general professional cycle should take the same at the baccalaureate level.

5. It is necessary to change the system of learning technology, for this purpose should be: rational reduction of volume of classroom teaching and shifting emphasis to independent work; independent work should be planned as a joint work with the student to solve problems and scientific problems, performing of projects and dissertations with an equal share responsibility for the results.

6. It is necessary to develop internal, external of quality control systems, training, assessment of the level of acquired knowledge and competences.Изменение системы управления и организации обучения студентов.

7. It is necessary to economic labor incentives teaching staff of universities as the reconstruction of the system of higher education.

References:

1. Law of the Republic of Uzbekistan on education [Electronic resource]. URL: http://www.lex.uz/mobileact/15622
2. The National Programme for the personnel training of the Republic of Uzbekistan [Electronic resource]. URL: http://www.lex.uz/pages/GetAct.aspx?lact_id=19769
3. Main provisions of the Bologna Declaration [Electronic resource]. URL: http://erasmusplus.uz/bolonskiy-process/Main-provisions-of-the-Bologna-Declaration/index.htm
4. CLAIU's Opinion on the Sorbonne/Bologna Declaration [Electronic resource]. URL: http://www.aic.lv/ace/ace_disk/Bologna/Statem/CLAIU.PDF

Section 8. Agricultural sciences

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Effectiveness of low-volume irrigation for orchard in farms of the south of Russia

Abstract: The efficiency of low-volume irrigation for orchards in the conditions of southern region of Russia. The material for the study of the question was obtained by routing studies of farms in the region. Defined improvement the water content of leaves during the growing season, including during the period of summer drought, the optimum content of nutrients in the leaves, shoots, increasing plant productivity.

Keywords: orchards, low-volume irrigation, the water content of leaves, nutrients in the leaves, apple productivity.

The flat part of the Krasnodar Territory is the basis of agricultural production in the region. Leached low-humus superthick chernozem is the most valuable in agronomic terms, also for fruit corps. The average annual rainfall here is up to 700 mm or more, but rainfall is uneven. In winter, there is often an increased moisture accumulation in the humus horizon because of the low water mobility at low temperatures and systematic soil moisture in spring. In summer with a decrease of moisture reserves and soil drying, occurs fast water flow due to the prevalence of the capillary porosity (up to 85% in comparison with noncapillary). [1–7]. This is the reason of crops unsatisfactory moisture, also it greatly reduces the availability of mineral elements, including received from fertilizers, disrupting the process of root nutrition during the crop formation and fruit crops' buds differentiation. Furthermore, in summer there is a lack of rainfall with high air temperatures and dry winds in the conditions of the southern region of Russia. From June to August the daytime temperatures reach 38 °C and above, the average temperature is 24–27 °C, and the temperature of the arable soil horizon often rises to 30 °C. In these conditions, particularly important to create the optimum mode for fruit trees water consumption and the initial conditions of moisture for the growth and development of young fruit trees. The most economic and effective way to optimize the water regime of fruit plants is drip irrigation, it has firmly established as the must-use agricultural method for horticultural activities in the region's farms, and also as a stimulus for fertigation. Stimulating activity of the regional administration and the relevant departments related with the compensation of capital expenditures for business entities, as well as practical advices and guidance of scientists and specialists encourage gardeners to introduce drip irrigation.

Figure 1. Four-year planting group of dwarf apple varieties ripening in winter and equipped with drip irrigation system

Material for the study was obtained from the route surveys of farms enterprises of Dinskoi and Timashevsky districts of Krasnodar Territory. Intensive planting of fruit crops in farms presented in arrays of 3–5 hectares with an arrangement of plants from 5.0 x 2.0 m to 4.0–4.5 x 1.2–0.6 m (Fig. 1). Basically they consist of the dwarf winter period ripening apple on stocks of domestic and foreign selection. Bulk of the roots of dwarf apple reached the productive period is concentrated in 0–80 cm under the soil layer, which ensures high efficiency of drip irrigation method.

Installation of drip irrigation systems is generally carried out immediately after the installation of supports, trellises and planting. Special requirements for the quality of irrigation water: salt content should not exceed 1.5 g/l, with harmful alkaline salts content of water should not exceed 0.2–0.3 g/l.

Depending on the layout of trees, 2 droppers per plant are accounted, located at a distance of 60 cm and a height of ~ 35 cm from the soil surface. Systematic irrigation regime provides hydration of a soil to a depth of 60 cm or more, depending on the duration of irrigation and irrigation water flow within 1.5–2.2 l/h. Under these irrigation parameters, most often characteristic circuits are created with moisturized contour not exceeding 10 cm in diameter (Fig. 2).

Figure 2. Typical circuit moisture under drip irrigation of an orchard

Soil moistening in near-stem zone of plants creates the best mode of aeration throughout the growing season, especially during the summer drought, due to increased content of available nutrients. The influence of these factors on the physiological condition and productivity of apple were analyzed on the example of the fruit-bearing apple varieties: Idared, Golden Delicious and Jonagold under conditions of a number of farms enterprises and farms of Krasnodar region.

Determined that the water content of apple leaves during the growing season when irrigation is higher than in rainfed conditions by 1.6–12.0% depending on the cultivar (Fig. 3), and during the summer drought related forms of water content higher than in rainfed conditions on 2.9–9.0%, especially in stands with the highest density of plants per hectare.

Against this background, determined average content of main mineral elements in the leaves of apple shoots within optimal values: nitrogen — 1.8–2.4%, phosphorus — 0,15–0,32%, potassium — 1.2–1.7% calcium — magnesium 0.7–1.6% — 0.2–0.4%. Trace element content varied for boron — 20–30 mg/kg, manganese — 40–60 mg/kg, copper — 8.10 mg/kg, zinc — 30–135 mg/kg.

Most favorable moisture regime also contributed to increased productivity of plants. Specific productivity of apple plant crown volume averaged by grades from 3.3 to 6.0 kg/m^3 (at spindle-forming system). Analysis of commodity products quality in accordance with the UNECE Standard FFV- 50 also showed the benefits of using drip irrigation system in the apple orchard. The highest percentage of high-value products — 85–92% — obtained on the background of the optimum moisture availability of plants, with an average weight of 140–160 g fruit (cultivar Idared), 150–170 g (cultivar Golden Delicious), 180–200 g (variety Jonagold).

Thus, the effectiveness of low-volume method (drip) irrigation for dwarf garden for farms of the region is characterized by the creation of moisture regime, contributing to a fuller realization of production potential of apple plants by optimizing the water content of leaves during the growing season, including the summer drought period, the optimal content of nutrients in the leaves of the shoots. Against this background, getting mostly high-value fruits is guaranteed, thus ensuring high profitability.

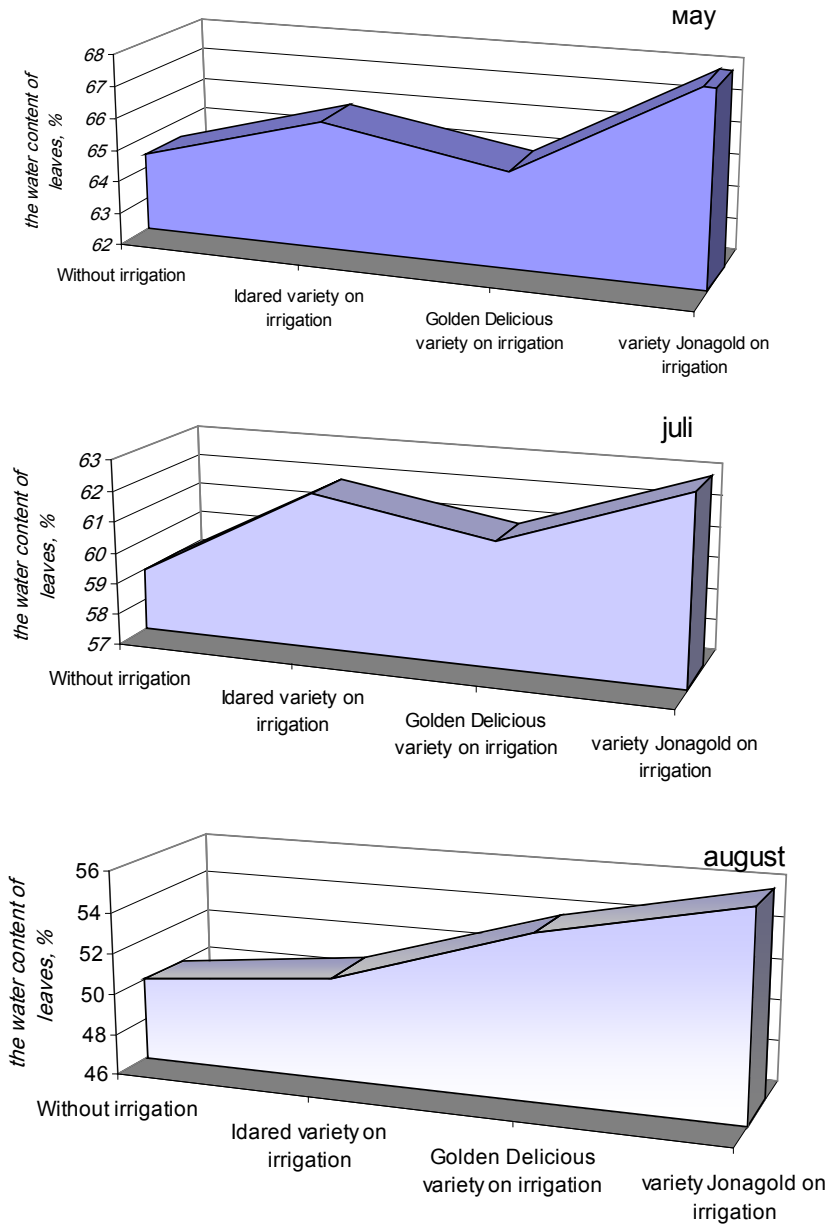

Figure 3. The dynamics of water content of apple leaves for growing season

References:

1. Classification and diagnosis of soil in USSR/V. V. Egorov, V. M. Friedland, E. N. Ivanov [et al.] – Moscow: Kolos, – 1977. – P 221.
2. Soil of Krasnodar region, their use and protection/V. F. Valkov, Y. A. Shtompel, I. T. Trubilin [et al.] – Rostov-on-Don, – 1996. – P 193.
3. Simakin A. I. Agrochemical characteristics of Kuban chernozems. – Krasnodar, – 1969. – P 278.
4. Sergeeva N. N. Morphogenetic peculiarities of the development and the apple diet in a south Russian/N. N. Sergeeva, L. L. Buntsevich//Agricultural Biology. – 2010. – No 5. – P. 92–97.
5. Agroecology/Ed. V. A. Chernikova, A. I. Chekeresa, – M.: «Kolos», – 2000. – 536 p.
6. Goncharova E. A. Water status of cultivated plants and its diagnostics/E. A. Goncharova. – St. Petersburg: WRI, – 2005. – 112 p.
7. Trunov I. A. The impact of drought on the growth of leaves and shoots in fruit crops/I. A. Trunov//New varieties and cultivation technology of fruit and berry cultour for the intensive type of gardening. – Eagle: VNIISPK, – 2000. – P. 231–233.

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Hydraulic calculation of changeable irrigation sediment reservoir

Abstract: In this article we offer a calculation method for the changes in the river sediment distribution with hydraulic parameters. We also determine for measured and accounting distribution of the sediment by length of the river flow.

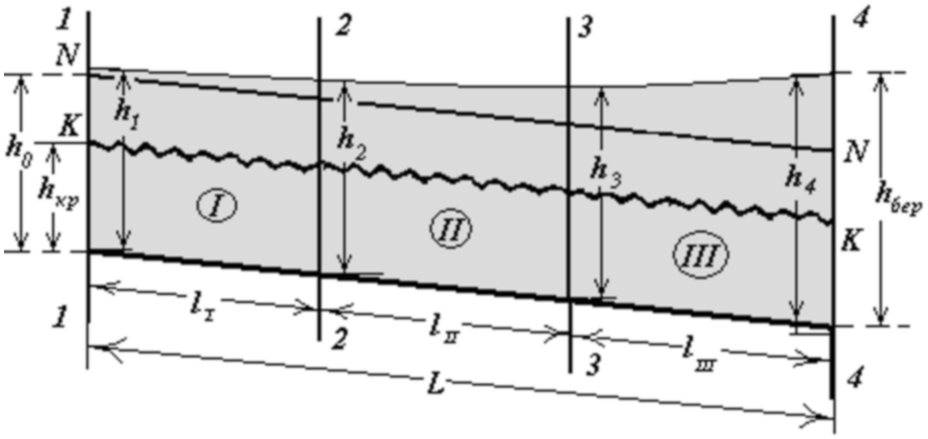
Keywords: main canal, irrigation sediment reservoir, water, water flow, sediment.

Detection in the water bend to learn theory of effect of compressions and the meaning of experiment researche, done works on this way expecially current during the regullarly action and during the irregularly action illustrated that a few researches.

So many years analysis, experiment and researches in field, theoretical sum up show that, the mainly reason for change of amount of stable compression in current that the changing current of speed. It depends on changes current area. Because of extensible and taper off current in cross avulsion for calculate length current of compression, we have to know middle speed of current changes. However, now changeable current for compressions length current about explanation of theoretical works undone.

Changeable avulsion sediment reservoir for irregularly action of differential indexing depend on hydraulic process. Action to explain differently. [1; 2; 3 and etc.].

The meaning this task we can solve through this circuitry: $i > o$: $h_o > h_{кр}$.



Picture 1. circuitry of water's irregular action in the water bed

In general, irregular action of differential indexing, we can write this: [2; 3; 4; 5; 7 and etc.].

$$\frac{dh}{dx} = \frac{i - \frac{Q^2}{\omega^2 C^2 R}\left(1 - \frac{\alpha C^2 R}{g\omega}\frac{\partial \omega}{\partial x}\right)}{1 - \frac{\alpha Q^2 B}{g\omega^3}} \qquad (1)$$

These are:

C – Shezi coefficient; R – Hydraulic radius;

ω – surface of current; B – width stream surface;

Q – use of stream; α – Carioles coefficient.

In the water bed fouling gathering and to learn process of washing, we should find compressions lenght current for division's orders.

Irrigation sediment reservoir and irrigated canals calculate for learning fouling gathering process is very important. Especially, sediment reservoir at put the begin of line. This line, big fouling gathering through lake by the way, through Amudaryo, central Asia and different lakes from Caucasus. To get good result from compressions routine, it depends on choose right sediment reservoir measure. The masurment of sediment reservoir size is marked by the level of sediment.

Not enough cleaning the current causes gathering fauling in the channels; in the big speed of water cleaning causes erosen of water bed, keeping little parts in the sediment reservoir interfere reaching mineral fertilizer the irrigated fields. Analyses the literature showed, that sediment of fouling are mainly at the beginning of sediment reservoir it happens because of the changing stream speed dramatically [1; 2; 3; 7 and etc.].

Cross stream changing causes stream spead changing, at the resuld copability of loud supplying changes. in this short part most of sediment kept. Sediment along this length make difficult control particle sediment as the result of this containing mineral fertilizer sediment will move. That must be shown that sediment reservoirs in channels mainly work in the regime of increasing and decreasing of water. This case causes changing stream speed in the length of sediment reservoirs and at the result stream loud also changes. That's why for the sediment reservoirs which work in not similar regime we can use above mentioned formulas. Because these formulas are

used for regular stream. We use this method to calculate division along the stream strength.

To find the length of current for fouling changes kinetics energy, we can do this:

$$\frac{dK_x}{dx} = -g(\rho_T - \rho)W_T n \sin\alpha + \frac{1}{2}\rho W_T n \frac{d\vartheta_T^{\,2}}{dx} \qquad (2)$$

There are: ρ and ρ_T - equally liquid and hard molecule;

W_T – hard molecule size like to ball;

ϑ_T – in current speed of compression;

g – velocity free fall;

$\sin\alpha$ – water bed result of horizontal corner;

n – number of molecule in current.

To find kinetics energy of current draft from molecule kinetics:

$$G = n\theta \qquad (3)$$

This

$$\theta = \frac{2}{3} m_T \vartheta_T^2 = \rho_T W_T \qquad (4)$$

In this way, we continue researches and find linking between speed of current and speed of draft:

$$\vartheta_T^{\,2} = (\frac{d_0}{d_i})^3 \vartheta^2 \qquad (5)$$

Use formula (4) and find this:

$$\frac{dK_x}{dx} = -g(\rho_T - \rho)W_T \frac{3}{2}\frac{K_x \sin\alpha}{\rho_T W_T \vartheta_T^2} + \frac{3}{4}\rho_T W_T \frac{K_x}{\rho_T W_T \vartheta_T^2}\frac{d\vartheta_T^2}{dx} \qquad (6)$$

$\vartheta = \frac{Q}{\omega}$ To be for Q=const, this

$$\frac{dK_x}{dx} = -\frac{3}{2} g \frac{(\rho_T - \rho)K_x \omega^2}{\rho_T Q^2}\sin\alpha + \frac{3}{4}\frac{K_x d(\ln \vartheta_T^{\,2})}{dx} \qquad (7)$$

Doing integral from formula (2) and find this

$$K_x = C\exp\left\{-\frac{3g(\rho_T - \rho)^x}{2\rho_T Q^2}\int_0^X \omega \sin\alpha dx\right\}\exp(\ln \vartheta_T^{\,2}) \qquad (8)$$

As the result of integral routine, find C's border provide: *x=0;* $K_x = K_{нач}$.

$$K_x = K_0\left(\frac{\omega_0}{\omega}\right)^{2в}\exp\left\{-\frac{D}{Q^2}\int_o^x \sin\alpha\omega^2 dx\right\} \qquad (9)$$

As the result, use formulas (3) and (4) for find drafts' length of current we can use these formulas:

$$S = S_0\left(\frac{\omega_0}{\omega}\right)^{2в}\exp\left\{-\frac{D}{Q^2}\int_o^x \sin\alpha\omega^2 dx\right\} \qquad (10)$$

D – describe parameter of draft in current:

$$D = \frac{3g(\rho_T - \rho)}{2\rho_T}\left(\frac{d_i}{d_o}\right)^3;$$

There S_0, ω_0 – suitable, the beginning middle of fouling in transit and alive surface;

ρ ва ρ_T – density to liquids and hard particles; *d* – diameter of hard molecule.

Good side of offer tasks, that task has current length for draft of distribution, depend on changeable elements of current's hydraulic technician. These give us. the meaning of full process.

We can use this formula for x free length part for draft's divide to calculate. To find this

function we should see current opened water bed not even action.

In some way, we can write water bed length for change:

Widen $\omega_x = \omega_0 + 2tg\beta\ H \cdot x$ (11)

Narrow $\omega_x = \omega_0 - 2tg\beta\ H \cdot x$ (12)

There β – water bed corner widen or narrow;

H – the middle deep of current.

Widen water bed fouling length of current for calculate to divide, put in (11) and (10) and it does integer:

$$S = S_o\left(\frac{\omega_0}{\omega}\right)^{2в}\exp\left\{-\frac{D(\omega^3 - \omega_0^3)}{2Q^2 tg\beta\ H}i\right\} \qquad (13)$$

$D = \frac{3}{4}\frac{\rho}{\rho_T}\left(\frac{d_i}{d_o}\right)^3$. There S_0, ω_0 – suitable, the beginning middle of fouling in transit and alive surface;

ρ and ρ_T – equally liquid and hard molecule;

g – velocity free fall;

β – water bed horizontal corner;

d_i – diameter of current molecule;

d_0 – diameter of equal current speed;

H – the middle deep of current.

In Lake's currents hard molecule pi especially, regularly number And it equal 2600.., 2800kg/m^3 put the regularly number:

$$S = S_o\left(\frac{\omega_0}{\omega}\right)^{2в}\exp\left\{-\frac{D(\omega^3 - \omega_0^3)}{2Q^2 tg\beta\ H}i\right\} \qquad (14)$$

Determine this formula (14) in analyst is hard, so we can find about it in next chapter.

As the result of this formula (14), we can find length of current in hydraulic technician parameters.

The meaning of (10) and (14) tasks system we can see 2 decision. Firstly, length of water bed for hydraulic technician elements. Secondly, length of current for draft.

References:

1. Абальянц С. Х. Устойчивые и переходные режимы в искусственных руслах. – Л:. Гидрометеоиздат, – 1981. – 245 с.
2. Арифжанов А. М., Усанов М. Н. "Каналларда нотекис ҳаракатнинг ҳусусиятлари". – Тошкент, "Агро илм" журнали, – 2010, – 41–42 с.
3. Дебольский В. К. и др. Динамика русловых потоков и литодинамика в прибрежной зоне моря – М: Наука, – 1994. – 301 с.
4. Караушев А. В. Теория и методы расчета речных наносов. – Л:.Гидрометеоиздат, – 1977. – 444 с.
5. Ettema R. Review of alluvial-channel responses to river ice//J. of Cold Regions Eng. – No 16. – 2002. – P. 191–217.
6. Graf W. H., Cellino M. Suspension flows in open channels; experimental study//J. of Hydraulic Res. – 2002. – V. 40. – No 4. – P. 435–447.
7. Siacey M. Bowen A. The vertical structure of density and turbidity carrents I. Geophys. Rec. – 1988. – V. 93, – P. 3528.

Section 9. Technical sciences

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Energy-resourse saving machine for preparing soil for planting root crops on ridges

Abstract: The results of studies on the development of combined machines for preparing the soil for planting root crops on raised ridges.

Keywords: technology, potato, soil, machine, hull, subsoiler, roller, coulter, ridge, fuel consumption.

Introduction. The main task of agriculture in Uzbekistan is the full satisfaction of our population with all kinds of root crops and potatoes in particular. Increasing potato production and on this basis to further welfare improvement of the population is one of the main tasks of agriculture. The main factors to the further development of the production of root crops are a great labor and very small-scale mechanization of potato cultivation processes in comparison with other sectors of agricultural production.

The existing technology for the preparation of the soil cultivated root crops is carried out mainly in stages, ie, single-purpose machines in several passes. This technology of preparing the ground for planting root crops involves fertilizing, plowing, soil preparation for sowing (disking, harrowing, forming ridges, etc.) [1].

Multiple passages of technology through the manufacturing field lead to an increase in undesirable soil compaction by the wheels of tractors and machines, which entails a reduction of root crops yield. Such treatment is not soil protection and does not meet modern requirements.

The need in a timely manner in a short time high-quality soil preparation, soil protection from excessive destruction and compaction of the planting root crops in the shortest possible time have caused the creation of soil preparation techniques for planting potatoes on ridges and combination machines combining several process steps in the implementation of this technology [2].

Objects and methods of research. The object of research is a combination machine for soil preparation for planting root crops on raised ridges. The research used methods of system analysis and rules of agricultural mechanics.

The studies were conducted in district Kamashi in Kashkadarya region of Uzbekistan in 2014–2015. Background — stubble of winter wheat. Soil type — light brown soil. The average slope of the terrain $3^{0.}$ Humidity and soil hardness for horizons 0 … 10, 10 … 20, 20 … 30 cm was 8,1; 11,9; 12,8% and 2,55; 3,01; 3,27 MPa. The amount of crop residues 0,728 kg/m$^{2.}$

The results of research. In Karshi Engineering-Economic Institute of Uzbekistan, a prototype of combined machines for preparing the soil for planting root crops on raised ridges on the basis of the combined front of the plow is developed and manufactured. It is known that the front plows are different from traditional plows. They are small, does not depend on the length of the working width, and are symmetrically balanced compact design and low consumption of materials [3].

Combined machine comprises a circular knives 1, 2 subsoiler with opener 3 fertilizer, the right — and leftward winding screw plow bodies 4 and 5 with the guide plates 6, support roller 7, in the shape of a convex-concave curve (Fig.1). Each subsoiler 2 is set in the front right –and leftward winding bodies along the symmetric axis. In front of each subsoiler and the body through its watering cut installed disk blades 1. The Working width *B* of one module unit is equal to the width of the aisles formed.

Preparing fields for sowing root crops on the crests of the combined unit is as follows: first, circular knives 1 produce a vertical cutting of the soil in front of the subsoilers and watering cut bodies. This layer is separated from the soil of the array (Fig.1*a*). Chisel 2 loosens the soil on the ridge line formed at the same time a local fertilizer in two tiers opener 3. Then the body 4 and 5 with the guide plates wrapped in layers towards each other and form a ridge, and then prepare the final ridge, soil compactor 7 (Fig.1*b*). Way subsoil loosening on line forming ridges promotes the formation of a step in the bottom of the furrow and subsurface layer, respectively, detention and the accumulation of water in the zone of root for the root crops. Thus, in a single pass machine is processing and preparation of soil for planting root crops on raised ridges.

The use of the proposed technology and equipment contributes to quality of soil preparation for planting root crops in a short time, prevention of soil from the destruction and excessive compaction, reduction of energy expenditure, the cost of labor and resources, increase of root crops yield.

The experimental sample of the combined machine is a reliable process for preparing the soil for planting potatoes on the crests in laboratory and field conditions. It satisfies the agro-technical requirements for basic quality parameters: depth loosening the ridge area of 41,4 cm, 27,4 cm height of the ridges, the soil crumbling degree of 83,1%.

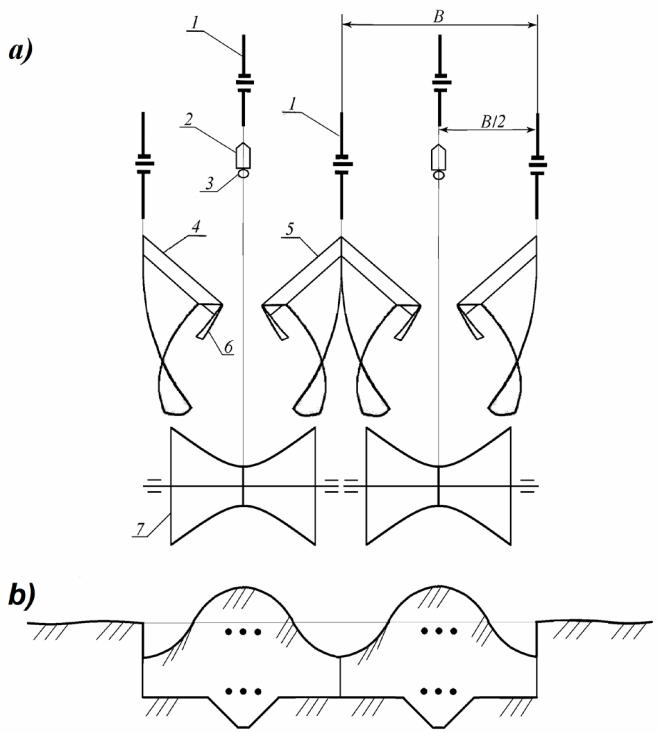

Figure1. The design concept of the combined machines (*a*) and transverse aisle profile after passing the machine (*b*): 1 – disc knife; 2 – subsoiler; 3 – item for applying fertilizer; 4 and 5 – right- and – leftward winding body; 6 – guide plate; 6 – packer.

Conclusion. Tests and calculations have shown that the combined use of the machine helps to reduce labor costs by 35 … 38%, the fuel consumption — by 39 … 42% and operational cost — 36 … 41% in comparison with existing machines.

References:

1. Mamatov F. M., Mirzayev B. S. Protivoerozionniye vlagosberegayushiye texnologii i texnicheskiye sredstva obrabotki pochvi v usloviyax Uzbekistana [Anti-erosion moisture saving technologies and technical means of soil cultivation in the conditions of Uzbekistan] Molodoy uchyoniy. – Kazan, – 2013, – No 10, – P. 263–265. (Russian).
2. Mamatov F. M., Mirzayev B. S., Kodirov U. Pochvozashitniye energoresrsosberegayushiye texnologii i mnogofunksionalniy agregat dlya obrabotki i podgotovki pochvi k posevu [Soil protecting and energy saving technologies and multi-function aggregate for processing and preparation of soil for sowing] Molodoy uchyoniy. – Kazan, – 2013, – No 10, – P. 256–258. (Russian).
3. Mamatov F. M., Mirzayev B. S., Ergashev I. T., Mirzakhodzhayev Sh. Kombinirovanniy frontalniy plug [Combined front plow] Selskiy mexanizator. – Moscow, – 2011, – No 10, – P. 9–11. (Russian)

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Influence of a fodder flour from nonconventional raw material on the microbiological processes occurring in mixed fodders at storage

Abstract: Results of research works under the analysis of influence of a fodder flour from nonconventional raw material on the microbiological processes occurring in mixed fodders at storage are resulted. The analysis of the data presented in work shows, that its introduction in a compounding, leads to decrease in intensity of development mushrooms and bacterial microflora in comparison with the control recipe that confirms their stable storage in current of 2 and more months.

Keywords: Mixed fodder, microorganisms, mushrooms, bacteria, storage, humidity, fats.

Compound feeds are difficult objects of storage in view of content of a number of organic components in them — grain of cereal cultures, cakes, cakes received in case of conversion of oilseeds, fish, meat and bone meal, products of conversion of grain and others, which are easily exposed in case of storage to destructive processes [1].

For improvement of quality of formula-feed products and enhancement of a food allowance of animals, important is introduction in structure of a forage of new nonconventional types of vegetable raw materials (a beer pellet, a grape pressing, baskets and stalks of sunflower. Therefore development of a compounding of the compound feeds including the increased quantities of cheap and available traditional and nonconventional fodder means is extremely urgent.

Methods of researches. Content of microflora of raw materials and compound feed was conducted according to GOST 51426–99 (ISO 6887–83). Microbiology. Stern, compound feeds, formula-feed raw materials. The common directorship on preparation of cultivations for microbiological researches.

Determination of total of microorganisms in food waste and compound feed: from average test of raw materials gave 10 g and mixed from 90 cm^3 of sterile water. Prepared washout, carefully stirred up a hinge plate within five minutes manually. Cultivation $1:10^2$ was used for definition the mitselialnykh of mushrooms, $1:10^3$ and $1:10^4$ for bacteria. Seeding was made in the deep way (on 1 cm^3) on the general (standard) nutrient mediums (SA and MPA). The sowed cups termostatirovat a cover down. In 48 hours counted the grown colonies.

Experimental part. The skilled and control samples of compound feed developed according to the recipe No. KS-1 for the krupnorogaty cattle at the age of 18–24 months, humidity of 10% stored in glass vessels within 60 days at a temperature of 20–24C0 and relative humidity 74–76%. Storage of compound feeds was made at air access that corresponded to storage conditions of compound feeds an embankment [2].

Table 1. – Change of quantitative structure of microflora of compound feed No. KS-1 (No. KC 1977) received with use of feed meal at storage. Addition of feed meal of 3,5,8%

subject of inquiry	Quantities of microorganisms, product KOE*/g	
	Mold mushrooms 10^3	bacteria 10^5
	After development	
control	**6**	**10**
recipe 1 (3%)	5	10
recipe 2 (5%)	**3**	**8**
recipe 3 (8%)	3	8
	In 30 days of storage	
control	**8**	**12**
recipe 1 (3%)	4	8
recipe 2 (5%)	**1**	**7**
recipe 3 (8%)	1	5
	In 60 days of storage	
control	**9**	**16**
recipe 1 (3%)	3	6
recipe 2 (5%)	–	**4**
recipe 3 (8%)	–	4

Note: KOE – colony the forming unit*

In all samples of compound feeds bacteria of the sort Pseudomonas, Bacillus and mold mushrooms of the sorts Penicillium and Aspergillus prevailed.

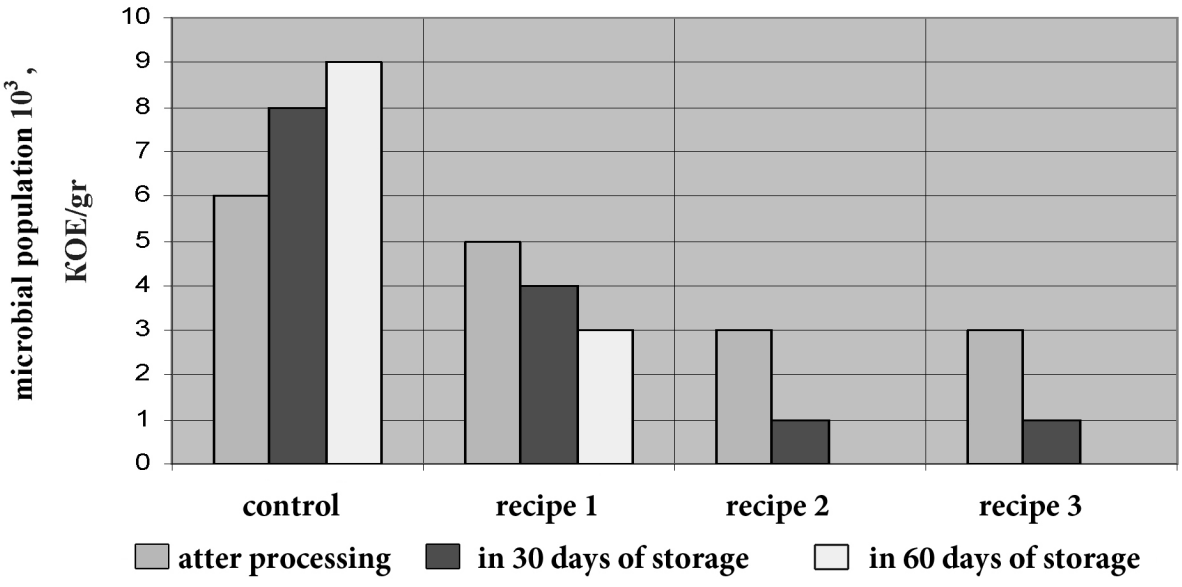

Figure 1. Change of quantity of mold mushrooms in compound feed No. KS-1 (No. KC 1977) received with use of feed meal at storage

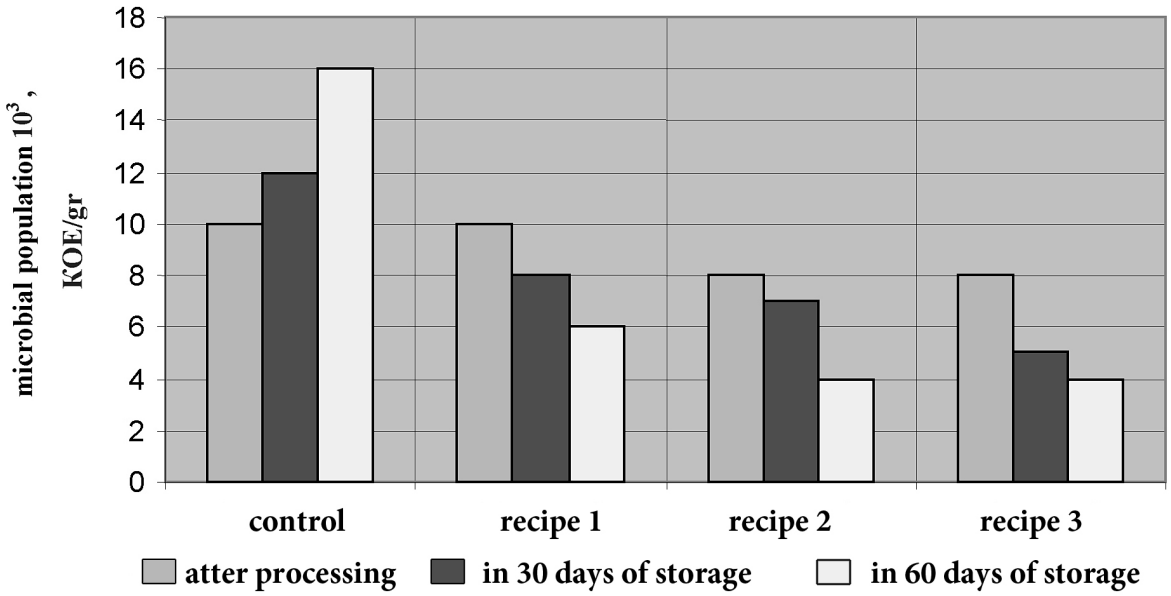

Figure 2. Change of quantity of bacteria in compound feed No. KS-1 (No. KC 1977) received with use of feed meal at storage

Decrease of the activity of mold and bacterial microflora in skilled recipes of compound feed, obviously, is explained by the fact that a compound component, in particular pectin has bactericidal and fungicide properties [3; 4; 5].

Having antiseptic properties, pectin acts on a bacterium strictly individually — has antibacterial activity in relation to not sporoobrazuyushchy causative agents of food poisonings, dysenteric bacteria, staphylococcus and is slightly weaker to colibacillus, suppresses putrefactive processes [6; 7; 8].

Apparently from table No. 1 in a control sample No. KC 65–6 within 2 months of storage there was an increase in total of microorganisms. When studying influence of feed meal on microbiological activity of compound feeds No. KS-1 (No. KS-1977) it was established that its introduction to a compounding, leads to decrease in intensity of development of mold and bacterial microflora in comparison with the control recipe that confirms their stable storage within 2 and more months. At addition of feed meal in number of 3, 5 and 8%, the quantity of mold and bacterial microflora in the course of storage didn't increase, and even decreased by 1–1,5 times to comparison with an initial sample (control).

References:

1. Rams M. T., Sabirov A. H. – Biochemistry of forages. – M.: Agropromizdat, – 1987. – 224 p.
2. Bukhrenin P. D., Bashkina L. V. Bulk storage of flour, bran and compound feeds. – M: Ear, – 1979. – 124 p.
3. Pectin. Productions and Application/Karpovich N. With and other//To: Harvest, – 1989. – 88 s.
4. Firsov G. G., etc. Pectin: main properties and productions. – Krasnodar, – 2004. – 154 p.
5. Rinaudo M. Physiocochemical properties of pectins in solution and gel states//Pectins and Pectinases: Proceedings of an International Symposium. – Wageningen, Netherlands, – 1996. – P.21–34.
6. Kostin F. D., Mekhtiyeva E. A. Bactericidal effect of pectin on phytopathogenic bakterii.//AN News MSSR. SER. биол. and chemical. Sciences. – 1972. – No. 1. – P. 79–80.
7. Litvinov M. A. Methods of studying of soil microscopic mushrooms. – Λ: Science, 1969. – S. 121
8. Selibera G. L. Big workshop on microbiology. – M.: The higher school, – 1962. – 491 p.
9. Shelukhina N. P. Scientific bases of technology pectin/Institute opr. chemistry. – T.: Ilim, – 1988. – 168 p.
10. Raloff J. Pectin helps fight cancers spread//Science news, – 1992, – Vol. 141. – N12. – 180 p.

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Mathematical model of dynamics of device for applying polymer composition on grind parts of the clothes

Abstract: This paper presents the scheme and operation of mathematical model of the dynamics of the device for applying the polymer composition to grind down the details of clothing. The settlement scheme and mathematical the module of dynamics of movement of a roller of the device is given.

Keywords: Devices, a polymeric composition, grinding, details, clothes, the settlement scheme, the equations movement.

Existing apparatus for applying a polymer composition onto slices parts of garments, which contains a bath of the polymeric composition, one above the other rollers, which are mounted on the shafts, and designed as a rubber bushing and impaled on it plastic simple sleeve interconnected with adhesive, wherein along the edges of the outer surface of the porous plastic sleeve protrusions smoothly interfaced with the sleeve surface, the lower roller immersed in a bath, and the top is connected to the upper tub [1].

The disadvantage of this design is the impact of the rigid porous plugs to grind materials, which are applied to the polymer material, wherein the thickness of the applied polymer coating may have a different thickness due to the inhomogeneity of the crosslinkable materials. Besides, no clear limit on the strips of polymer coating materials, as well as uneven flow of the liquid phase of the polymeric material, its thickness may have different meanings in grind materials. To eliminate these shortcomings we recommended a new design. The proposed design illustrated by a drawing, where Figure 1, shows a general view of the device for applying the polymer composition to grind parts cut.

An apparatus for applying a polymer composition onto garments grind part comprises a housing 1, the upper and lower component rollers mounted on the shafts 2 and having a resilient (rubber) bush 3, a deformable (rubber) sleeve 4 with a truncated conical through-holes 5 on the surface thereof, and protrusions 18, the edges of the sleeves 4 and 6 and the bearings 7, 8 upper bath to the polymer composition, the lower the bath 19 with the polymer composition, feed tube 9 with polymer feeding controller 10.

The proposed device operates as follows. When sewing fabrics pressed by the foot 14, the rack 15 and the needle plate 17. Promotion fabric on the stitch value is carried rack positioned in the slot of the needle plate. The rack submits the material just under the needle 16, and the direction of movement of material during sewing worker needs. When the needle 16 and the interaction of the hook (not shown) is formed lockstitch. Then grind materials fall under mutually rotatable upper and lower component rollers mounted on the shafts 2 and connected with the housing of the sewing machine 1 by means of bearings 6 and 7.

In the process of moving from the upper tissue bath 8 through the feed pipe 9 is supplied to the polymer composite deformable porous surface truncated conical through-holes 5 of the sleeve 4 and the upper roller is applied to the upper layer 11 of fabric 13. The film feed polymer composition is regulated by the regulator 10. At the bottom fabric layer 12, grind resin composition 13 is applied by deforming a porous sleeve 4, the lower roller having a porous surface and also truncated conical through-holes on the surface of the sleeve and is partially recessed into the polymer solution composition at the bottom of the bath 19.In the process of grinding the polymer composition is applied to a strip width of 15–18 mm so that the seam was in the center of the band. In order to ensure uniform application of the width of polymer composition 13 to grind materials 11 and 12, deformable porous (rubber) sleeve 4 rotating rollers provided with protuberances 18 (0.5–1.0 cm) on both sides. These protrusions 18 smoothly interfaced with the external cylindrical surface of the sleeve 4. In the process

of applying the polymer composite 13 due to the heterogeneity of grind materials 11 and 12, sleeve 4 copies these irregularities due to their deformation, and the deformation of elastic sleeves 3 rollers. When insufficient supply of polymeric material due to its wettability and capillarity supply of polymeric material derived from the truncated conical holes 5 and sleeve 4. This ensures even application of the polymer coating 13 grind materials 11, 12 on both the strip width, and thickness of coatings 13.

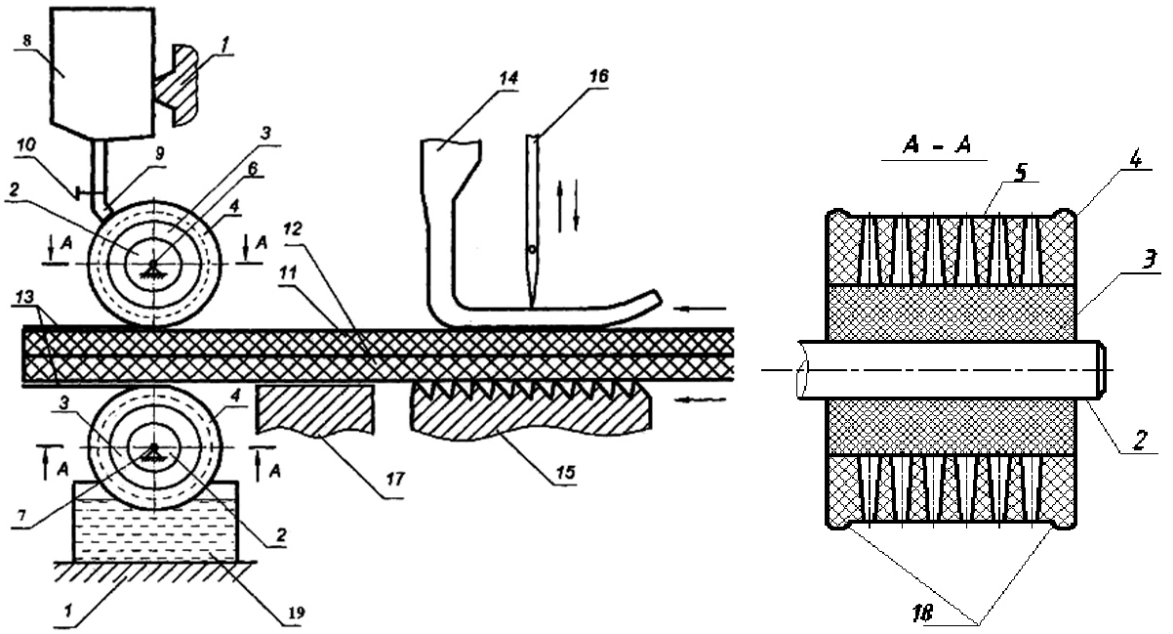

Fig 1. Device for applying the polymer composition to the wetted parts of clothing

Applying the developed device for applying a polymeric coating composition provides a polymer composition to grind garment component layer with sufficient, which leads to reliability and durability of thread connections. To this end, it is important substantiation of system parameters on the basis of studying the dynamics of the working sleeves (rollers) of the device. Figure 2 shows the kinematic scheme of the drive movement of the elastic clips. Movement of the rollers 2 is obtained from the engine (Fig. 2. not shown) via a drive shaft 7, a chain drive 9 and the shaft 3. Design scheme is shown in Figure 3.

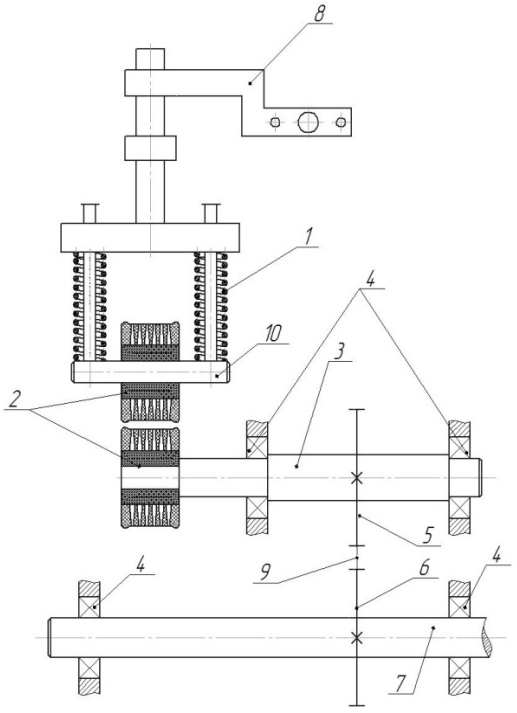

Figure 2. The kinematic scheme of the drive rollers

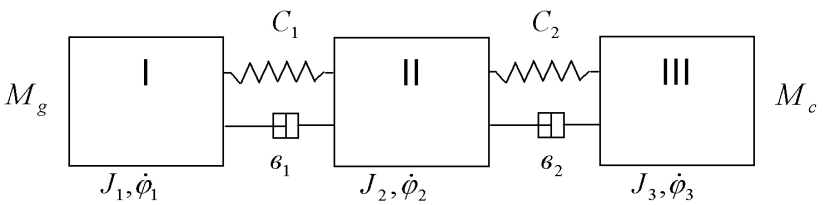

Figure 3. Design scheme

Where, I–extort mass of the work of the engine, shaft and the drive sprocket; II– mass of the extort driven sprocket, shaft and bushing roller; III– mass of the outer sleeve scheme

The mathematical model of the dynamics of rollers motion according to the designscheme in Figure 3, taking into account the mechanical characteristics of the engine, the elastic-dissipative properties of the chain drive and the elastic sleeve roller, as well as tech-

nological resistance caused by the polymer material and grind materials. At the same time, we used the II — Lagrange equations [2]. Thus, we obtained the following system of differential equations:

$$\dot{M}_g = 2M_k\omega_c - 2M_k p\dot{\phi}_1 - \omega_c S_k M_g;$$

$$J_1\ddot{\phi}_1 = M_g - в_1\left(\dot{\phi}_1 - \dot{\phi}_2\right) - c_1\left(\phi_1 - \phi_2\right);$$

$$J_2\ddot{\phi}_2 = в_1\left(\dot{\phi}_1 - \dot{\phi}_2\right) + c_1\left(\phi_1 - \phi_2\right) - в_2\left(\dot{\phi}_2 - \dot{\phi}_3\right) - c_2\left(\phi_2 - \phi_3\right);$$

$$J_3\ddot{\phi}_3 = в_2\left(\dot{\phi}_2 - \dot{\phi}_3\right) + c_2\left(\phi_2 - \phi_3\right) - M_c,$$

Where, M_g, M_k – the drive torque of the motor and its critical value; p – Number of pole pairs; ω_c – Circular frequency of the network; S_k – Sliding and its critical value; $\dot{\phi}_1$, $\dot{\phi}_2$, $\dot{\phi}_3$ – the angular velocity of the motor, the intermediate shaft and the outer sleeve of the roller; M_c – Technological resistance of polymeric material; c_1, c_2, $в_1$, $в_2$ – Coefficients of stiffness and damping circular chain drive roller and an elastic sleeve.

The laws of motion of the roller at various initial settingshas been derived based onthe numerical solution of differential equations. The best parameter settings of the drive rollershas been determined.

References:

1. Veselov V. V., Gorbunov I. D., Molkova I. V. Apparatus for applying liquid-phase polymer on sections cut parts. Proceedings of the universities. The technology of the textile industry. – 2007, – No 3. – P. 97–99.
2. Djuraev A. and others. The theory of mechanisms and machines. Ed. "G. Gulyamov". – Tashkent, – 2004. – P. 594.

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Method of calculating the kinematic parameters of steering gear ensuring a tractor minimum turning circle radius

Abstract: Calculating the parameters of a portal front axle and the steering gear of the perspective high-clearance cotton growing tractor 4K2 are specified in the article.

Keywords: a four-wheeled cotton growing tractor, front portal high-clearance axle of the steered wheels, the parameters of a front axle, steering linkage, setting angles of the steering gear, a turning angle of the front wheels, a minimum turning radius.

Turning the steering wheels of agricultural tractors in the course of working is performed by the driver by applying the steering control mechanism. If a turn must be sharper, then it is reasonable to use the right or left brake. In this case one of the driving wheels will be decelerated or blocked and then the rear axle differential starts functioning.

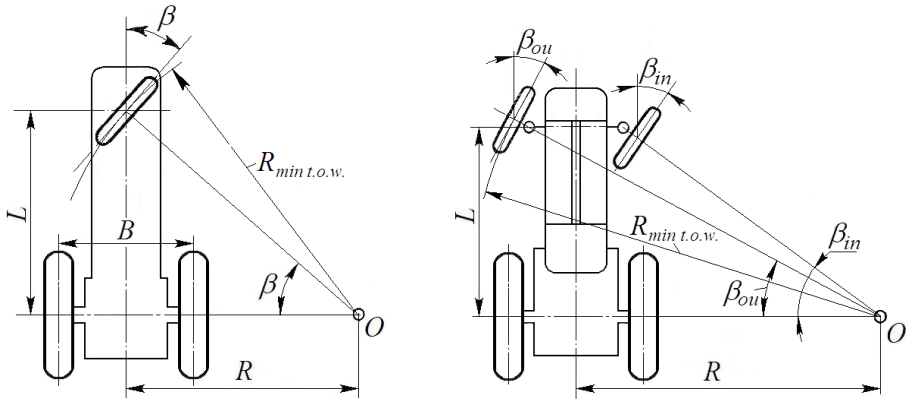
The tractor must be operated without much effort on the steering wheel, and for the purpose to maintain the desired track of the turning the guide wheels must move in pure rolling mode, that doesn't slide relative to the supporting face [1, 3–4]. In effort to facilitate the tractors driving they are equipped with hydraulic amplifying appliances of a steering control and the steering gear parameters will be optimized.

In addition, the quality of tractor driving is ensured by setting the guide wheels at certain angles — the break-up, convergence and steering stubs of bracket supports bending.

Figure 1 shows the classical scheme of the wheel tractors rotation.

On the fig. 1, *a* a turning scheme of cotton growing tractor having one-wheeled frontal axle.

Fig. 1, b shows a scheme of tractor turning 4K2 (4K4).



a) b)

Figure 1.Turning scheme of wheel tractors 3K2 and 4K2 (4K4)

Pure rolling of the guiding wheels at a tractor turning will be ensured in case if the axes extension of all wheels will crossover at a single point *O*, so called the turning center. As the tractor wheelbase is shorter, the shorter will be the distance from the turning center *R* until the middle of the wheels outside track and thus the tractor turning ability will get better, where $R_{min\ t.\ o.w.}$ minimum trace the turning radius of the outer wheel.

From Fig. 1, b it is seen that for any value of the turning angle, for example, with respect to the internal driven wheel β_{in} is always possible to determine the value of turning angle of the outside steering wheel β_{ou}, that is,

$$\beta_{ou} = arctg\frac{Ltg\beta_{in}}{Mtg\beta_{in} + L}. \quad (1)$$

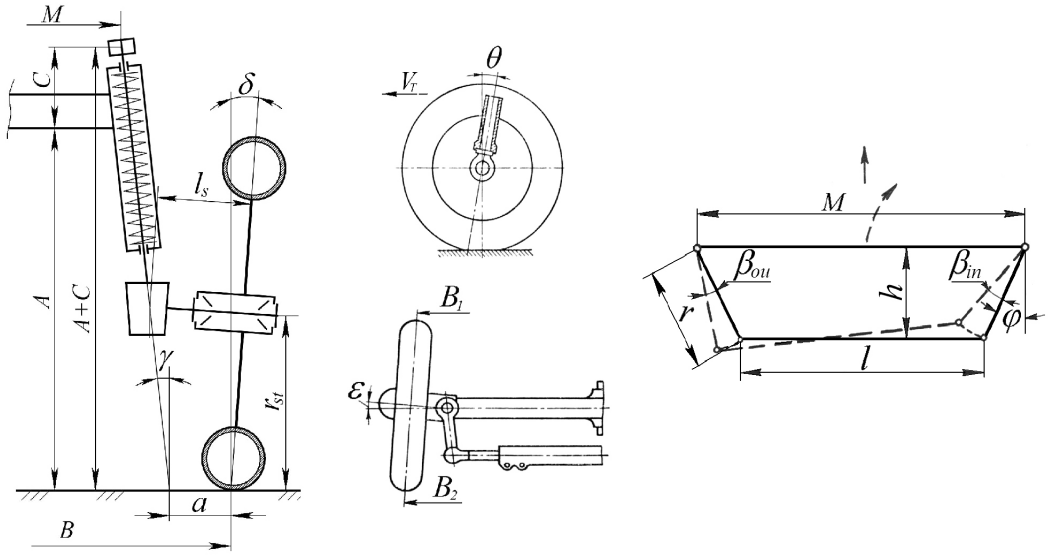
where β_{ou} and β_{in} — turning angles of the outside and inside steering wheels in layout, degrees; *L* — longitudinal tractor wheelbase, mm; *M* — a distance between the pivot axes of the turning stub, mm.

In the term (1) the value of *M* — distance between the pivot is determined by the following formula

$$M = B - 2\left[a + (A + C)\ tg\gamma\right], \quad (2)$$

where $a = l_s\left(\cos\delta - \sin\delta\ tg\gamma\right) - r_{st}\left(\sin\delta + \cos\delta\ tg\gamma\right), \quad (3)$

B — wheel tread of the tractor steering wheels, mm; *a* — shoulder of wheel running-in test in respect of stub axle, mm; l_s — stub axle length, mm; *A*+*C* — height of support center of the pivot lever assembly at claw, mm; γ — shaft axle elevation angle in the transverse flat surface, degree; δ– camber angle of steered wheels, degree; r_{st} — static radius of steered wheels, mm; *h*– height of steering linkage $h = r\cos\phi$, mm (Fig. 2.).



a) b) c)

Figure 2. Setting parameters if steered wheels (*a* and *b*) and the steering linkage (*c*) of the front axle (bridge) universal tractors.

Value of turning angle of the outside steering wheel calculated by the term (1) may be called theoretical value of this angle $\beta_{ou}^{th.}$.

Above specified regularity (1) is achieved by a steering linkage mechanism that ensures dirigibility and resistance of set direction of tractor movement. Tractor with wrongly designed or improperly adjusted steering trapezia arbitrarily change moving the direction, "yaws" in the field, will react inadequately to the impact of the driver's control activation, which reduces the quality of agro technical works, exceedingly will make the tractor operator to be tired and does not guarantee traffic safety.

Set turning angles of the tractor guiding wheels must be maintained in the course of whole operation. The tractor turning radius, maneuverability of a machine, headland width, time consumed for turns and other performance indicators depend on that.

Steering linkage is located in before the frontal axe (Fig. 3, *a*) or rear (Fig. 3, *b*).

In effort to get the correct balance between the angles of steered wheels, ensuring the ration constancy of *M/L* for a particular design of the tractor it is necessary to select out the dimensions of trapezoid elements; coordinating them with the longitudinal wheelbase of the machine; the distance between axes of pivots shafts and steered wheels spacing.

Considering (2) and (3) the expression (1) we can write the following form,

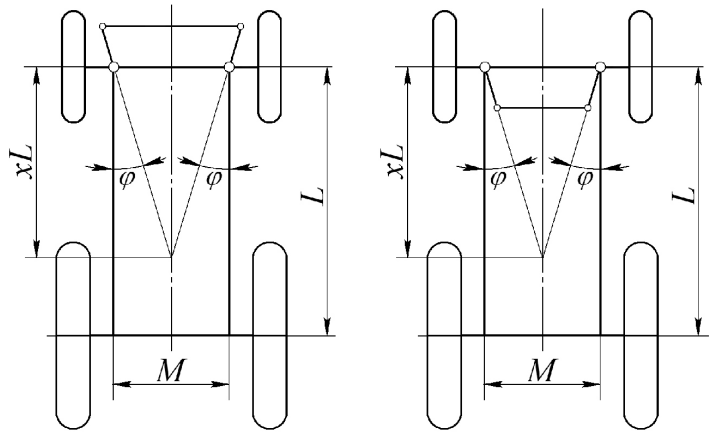
$$\beta_{ou}^{th.} = arctg\frac{L\ tg\beta_{in}}{\left\{B - 2\left[l_s\left(\cos\delta - \sin\delta\ tg\gamma\right) - r_{st}\left(\sin\delta + \cos\delta\ tg\gamma\right) + \left(A + C\right)\ tg\gamma\right]\right\}\ tg\beta_{in} + L}. \quad (4)$$

Let's consider steering linkage (Fig. 2, *c*). Analytical relationship between angles β_{in} and β_{ou} the steered wheels turn of tractor and design parameters of the trapezoid are described in the following formula [2, 222–226; 3, 408–412; 4, 668–675].

$$\beta_{ou} = \phi + arctg\frac{r\cdot\cos\left(\phi + \beta_{in}\right)}{M - r\cdot\sin\left(\phi + \beta_{in}\right)} - \arcsin\frac{r + 2M\cdot\sin\phi - 2r\cdot\sin^2\phi - M\cdot\sin\left(\phi + \beta_{in}\right)}{\sqrt{M^2 + r^2 - 2M\cdot r\cdot\sin\left(\phi + \beta_{in}\right)}}, \quad (5)$$

where *r* — length of pivot lever assembly, mm; φ — setting angle of pivot lever assembly throughout the longitudinal axis of the tractor, degree.

When selecting the steering linkage parameters necessary to ensure the lowest possible difference between the theoretical (the expression 4) and actual (in the words 5) angles of the steerable wheels turning during the whole process of turning until the maximum value turning angle of the internal β_{inmax} steerable wheel. The proposed method allows to implement such a choice as at the stage of designing tractor as during the verification calculation of existing steel structures of tractors and other self-propelled machines with the same steering mechanisms of turning.



a) b)

Figure 3 — Location of the trapezoid on the tractor; a — front; b — rear

The main parameters that determine the kinematics of steering linkage are setting angle φ of pivot lever assembly at the neutral position of steerable wheels, distance M between the centers of shaft of the turning pivots and a length r of the pivot lever assembly.

Setting angle of the steering linkage pivot lever assembly (Fig. 2 and 3)

$$\varphi = arcctg\frac{2xL}{M}, \quad (6)$$

where x — coefficient of proportionality depending on the cross-section point of location of pivot lever assembly extension pivot arms axles with longitudinal axis of the tractor; x=1 cross-section point overlap with the tractor kinematic center.

φ optimum angle value is located in the range x= [0.7–1.0], [4, 668–675].

Length l of the lateral pull of steering linkage:

at rear location (Fig. 3, b)

$$l = \frac{M}{1+2y\sin\phi} \quad (7)$$

at the front location (Fig. 3a)

$$l = \frac{M}{1-2y\sin\phi} \quad (8)$$

where $y = \frac{r}{l} = 0{,}12\ldots0{,}16$, [4, 668–675]. (9)

As an example let's perform step by step calculation base on proposed methodology of steering linkage for perspective of the cotton growing tractor JSC "Tashkent agricultural techniques producing plant", in the event: L=2560 mm, B=1800 mm, the M=1395 mm, a=93mm, l_s=161 mm, r_{st}=460 mm, A+C=890 mm, γ=7°, δ=4°, β_{inmax}=55°, mounted tires 11,2R20, agrotechnical clearance of 825 mm, a trapeze will be located behind the front axle beam.

1. In terms of (1) if M/L=0,545 let's build up theoretical dependency $\beta_{ou}=f(\beta_{in})$ (Fig. 4).

2. According to terms (4) and (5) for different values of x let's build up a family of curves $\beta_{ou}=f(\beta_{in})$ corresponding to x = 0.7; 0.8; 0.9; 1.0 (Fig. 4).

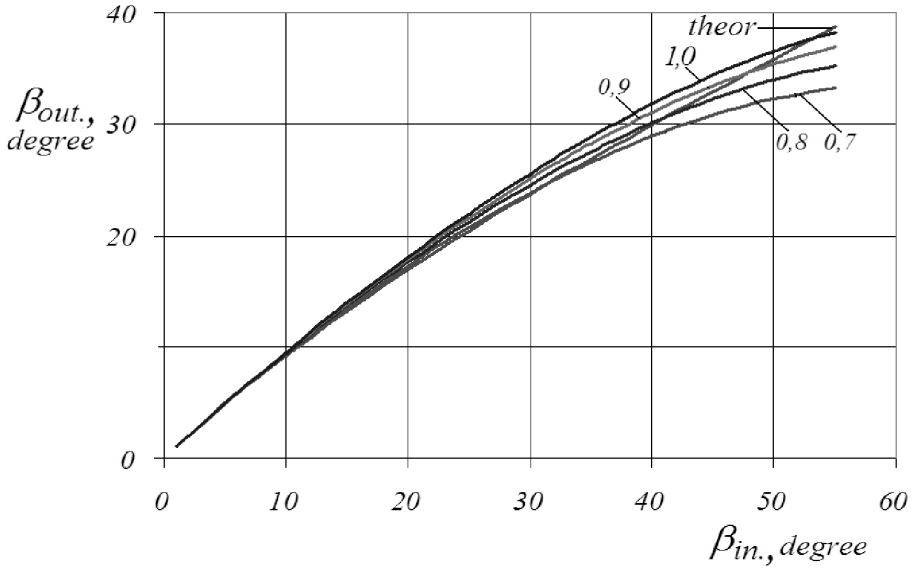


Figure 4 — Dependence $\beta_{ou}=f(\beta_{inmax})$.

3. Base on the criterion $\max_{1\le\beta_{in}\le\beta_{in\max}} \left|\beta_{ou}-\beta_{ou}^{th}\right| \xrightarrow[\Omega]{} \min$ (8) for the largest value of the turning angle of internal wheel β_{in} =55° on the family of curves in Fig. 4, let's find the optimal value of quantity x = 0,922, and base on formula (6) — the optimum angle value will be φ= 16°28'.

The optimum value of x is found out by applying the Microsoft Excel software by using "Search solution" function.

4. Assuming the value of y = 0,14 base on the formula (6) let's find the cross tie rod length l=1292,5mm, and from the condition r=(0,12–0,16) l — length of pivot lever assembly r=155–207 mm.

References:

1. OST 23150-80. Wheeled tractors. Fluid power drive of steering system. Technical requirements. – Moscow: NATI printing house. – P. 8.
2. Barskiy I.B. Designing and calculation of tractors. – Moscow: Machinery, – 1980. – P. 222-226.
3. Anilovich V.A., Vodolazhchenko YU.T. Designing and calculation of agricultural tractor. – Moscow: Machinery, – 1976. – P. 408-412.
4. Sharipov V.M. Designing and calculation of tractors. – Moscow: Machinery, – 2009. – P. 668-675.

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Analysis of magnetic field in the air gap not expressly pole synchronous generator excitation biaxially at asymmetrical short circuit

Abstract: This article on the developed mathematical model based on the equations of the Park — Gorev considered magnetic field analysis of questions in the air gap is not salient pole synchronous generator with a two-axle drive with asymmetric short circuits.

Keywords: magnetic field, the air gap is not salient-pole synchronous generator, longitudinal — transverse field winding.

The most common accident in electric power systems is a sudden short-circuit on the transmission lines on the tires on the generator station or the terminals, the advent of highly dangerous high currents and other mode parameters [1–3]. The occurrence of electromagnetic transients in electrical systems is largely determined by the behavior of its members and the nature of the process in rotating machines and their design features.

In general, asymmetric modes of the machine — regardless of the choice of the variables that characterize the occurrence of electromagnetic transition process, describing its differential equations will contain periodic coefficients.

To study the electromagnetic processes used traditional schemes "biaxial generator excitation — line — the infinite power of tires", and for this power equation used Park — Gorev takes into account the presence of a transverse field winding [4; 5].

It is known that the analysis of the influence of the magnetic field in the air gap neyavnopolyusnogo biaxial synchronous generator excitation with asymmetric short circuits performed using a mathematical model based on the complete equation Park — Gorev. Given the method of calculation of the magnetic field in the air gap is not salient pole synchronous generator with a two-axle drive with asymmetric short-circuit at the terminals of the generator and the busbar station.

It should be noted that the change in the magnetic field from the perspective of the impact of the displacement of large and small axes of the ellipse shape of the magnetic field in the electromagnetic processes in generators biaxial excitation, which is taken into account through the flux linkage. Here the main influence on the configuration of the field excitation currents have transverse rotor winding [5].

For unbalanced short circuit in the electrical system of differential equations of its elements of synchronous generators and generators biaxial excitation describing electromagnetic processes in them, there are periodic coefficients that are a function of time.

Electromagnetic influence of transients in the shorted circuit in the parametric oscillation circuit free phase takes the form of an external disturbance in nature representing elektrodvuzhischeysya forces is a complex periodic function of time, containing an infinite number of odd and even harmonic components. The intensity of the even harmonics shift depends on the angle between the pole axis and the short axis at the time of winding asymmetrical short circuit, and its maximum possible value depends on the difference between the longitudinal and transverse responses machine ($X''_d - X''_q$), which acts as the mutual amplitude ratio between the short-circuited and the free phase.

Nature increasing the stator leakage flux associated with the emergence of the free current of the rotor winding to create an ad-

ditional magnetic flux co-directional flux field winding (Ψ_f) and preventing the entry of the stator flux. The greater the voltage drop of the magnetic (i. e., energy dissipation of the magnetic field) in the rotor windings, the less will be inducted elektrodvuzhischeysya forces induced in the phases reduces open magnetic flux [6–8].

By using a common method of bringing the differential equations of the synchronous generator stator windings in the vector and its conjugated form resulted in and subject to the conditions of asymmetry obtain a system of differential equations taking into account the conditions of the turbogenerator with simultaneous unbalance biaxial excitation expressed in terms of flux linkage are shown in Tables 1 and 2.

The equations of flux linkage synchronous turbogenerator stator windings with biaxial excitation

Table 1.

Kind of short circuit	Terms of asymmetry	The equations of the stator flux linkage circuits
Single-phase	$U_a = 0$ $i_b = i_c = 0$	$\Psi_d = X_{ad}(1+\cos 2\gamma)(i_{fd}+i_{1d}) - Xad(i_{fq}+i_{1q}) - 2(X_d + X_K)i_d$ $\Psi_q = -X_{ad}\sin 2\gamma(i_{fd}+i_{1d}) - X_{aq}(1-\cos 2\gamma)(i_{fq}+i_{1q}) - 2(X_q + X_K)i_q$
Two-phase between the phases	$U_b - U_c = 0$ $i_b = i_c = i_K$ $i_a = 0$	$\Psi_d = \frac{X_{ad}}{2}(1-\cos 2\gamma)(i_{fd}+i_{1d}) + \frac{X_{ad}}{2}\sin 2\lambda(i_{fq}+i_{1q}) - (X_d + X_K)i_d$ $\Psi_q = \frac{X_{ad}}{2}\sin 2\gamma(i_{fd}+i_{1d}) + \frac{X_{ad}}{2}(1+\cos 2\gamma)(i_{fq}+i_{1q}) - (X_q + X_K)i_q$

Table 2.

Kind of short circuit	Terms of asymmetry	The equations of flux linkage stator windings
Single-phase	$U_a = 0$ $i_b = i_c = 0$	$\frac{d\Psi_d}{dt} - \omega_r \Psi_q - (2r_c + 3r_K)i_d = 0$ $\frac{d\Psi_q}{dt} + \omega_r \Psi_d - (2r_c + 3r_K) = 0$
Two-phase between the phases	$U_b - U_c = 0$ $i_b = i_c = i_K;\ i_a = 0$	$\frac{d\Psi_d}{dt} - \omega_r \Psi_q - (r_c + r_K)i_d = 0$ $\frac{d\Psi_q}{dt} + \omega_r \Psi_d - (r_c + r_K) = 0$

The equations of flux linkage stator windings Ψ_d and Ψ_q with asymmetric short circuits are determined at each step of integration.

In the case of the absence of complete damper winding formed by another stray field, namely in the space between the poles. This situation entails a decrease of free currents, in connection with which the free magnetic fields associated with the stator, will change much in size due to the fact that they are periodically superimposed a large leakage flux directed along the axis mezhpolosnogo space. This results in strong distortion of the current waveform and magnetic field. In machines with biaxial agitation and full preservation damper system cause the current waveform and the shape of the magnetic field is approaching circular shape due to the presence of a transverse field winding.

From a physical point of view when an asymmetrical switching circuit in asymmetrical stator electric machines appearing pulsating magnetic flux, which is like a combination of two flow systems, one of them is rotated in the direction of rotation of the rotor, and the other in the opposite direction relative to the stator windings. The magnetic field rotating in the opposite direction leads to the damper and excitation windings cross-excitation constituents elektrodvuzhischeysya strength and power, which vary with double frequency, which largely inhibit the effect back to the rotating field.

For computational analysis of the magnetic field in the air gap of the generator during asymmetrical short-circuit at the terminals of the phase windings of the equation used in the tables № 1 and № 2.

The figures (Figure 1 and Figure 2) shows the waveform of the pilot study forms a magnetic field in the air gap for single-phase and two-phase short-circuit at the terminals of the traditional model of synchronous generators with performance and biaxial excitation. From comparison of the results shows that the shape of the magnetic field in the air gap of the synchronous generator neyavnopolyusnogo uniaxial and biaxial excitation remains closer to a sine wave with asymmetric short-circuits than the conventional turbine generator synchronous design. Such a difference in the forms of distribution of the magnetic field due to the presence of the transverse field winding synchronous generators biaxial excitation, which will suppress the distortion of the magnetic field due to which field to get closer to the circular, which positively affects the work of the synchronous generator with a two-axle drive with asymmetric modes, often occurring in during operation of the electrical system.

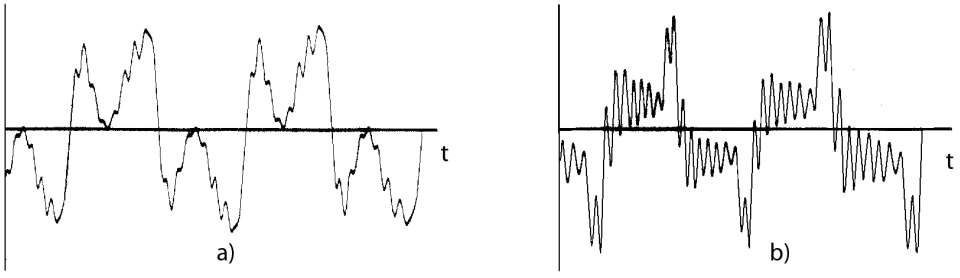

Figure 1. Powered magnetic field in the air gap of the synchronous generator of conventional design (a) and biaxial excitation synchronous generator (b) in a single-phase short circuit

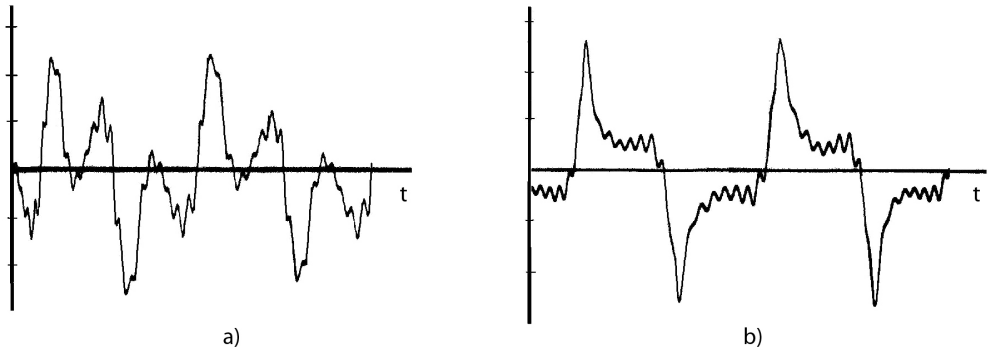

Figure 2. Powered magnetic field in the air gap of the synchronous generator of conventional design (a) and biaxial excitation synchronous generator (b) in a two-phase short circuit

Conclusion: In spite of the complexity of the constructive execution of synchronous generator excitation biaxial they due to the suppression of higher harmonics at the unsymmetrical short circuit, have a positive impact on the operating conditions of the electrical system.

References:

1. Ryudenberg R. Operating modes of electric power systems and installations. A,: Energy, – 1978. – 336 p.
2. Vazhnov A. I. Transients in AC machines. L.: Energy, Leningrad branch, – 1980. – 256 p., il.
3. Ahmatov M. G. Synchronous machines. Special course. – M.: Higher School, – 1984.
4. Pirmatov N. B., Ahmedov M. G. Disturbances are of synchronous machines biaxial excitation. Tashkent. Publisher TSTU, – 2003. – 158 p.
5. Allaev K. R., Khaydarov S. D. Settlement – experimental study of short circuit modes of synchronous and asynchronous generators.//Math. UzSSR series tehn. Sciences, – 1986, – No 5. – P. 23–26.
6. 6 Khaydarov S. D. Investigation of electromagnetic processes the electrical system of the methods of instantaneous values. Problems of energy – and resource, – Tashkent – No 1–2, – 2012. – P. 38–46.
7. Urusov I. D. The linear theory of oscillations of synchronous machine. – M.: Publishing the USSR Academy of Sciences, – 1960. – 165 p., il.
8. Morsy M.S, Amer H. H., Bodr M.A, El-Serofi A. M. «Transient stebilegitg of synehronous generators with two-axis slip frequency excitation» England, – 1983.

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Reducing method of the redundant links in the kinematic pairs of batten lever mechanism of weaving looms

Abstract: In this article, new scheme of cam and lever battant mechanism with compound hinges, including elastic elements of weaving looms are investigated. The technique of liquidation and decrease in superfluous communications in kinematic steams of battant mechanism of the weaving looms are presented.

Keywords: weaving loom, beater, cam, lever, elastic element, inertiaforces, reactionforces, superfluous communications, mobility degree, and kinematic pair.

In practice of weavingindustry, thebattenmechanisms are divided into two types, crank type and cam type. Crank type battenmechanisms are easier on the device and have a high mechanical efficiency, so on the shuttle weaving looms set mainly

the crank mechanisms. Cam batten mechanisms used on shuttleless looms [1].

Battenloom mechanismis known in the form of the four-bar hinge mechanism [2]. Batten mechanism consists of a body (frame), crank, connecting rod, rocker arm, the carrier and the top of the reed batten, connected to each other by hinges. The disadvantage of this design is a significant reaction forces in the joints between the connecting rod and the reed, as well as between the crank and connecting rod at high-speed modes of fabric production. Also in the extreme positions of the sharp change kinematic and dynamic parameters are thread breakage, resulting in poor performance of the loom. Fig. 1 shows a diagram of the kinematic scheme of the linkage battenmechanism. During rotation of the crank 2, the connecting rod 3 makes flat — parallel movement, and Batten (lever) 4 swings about the pivot O2. In operation of the links in the kinematic pairs-reaction force occur due deflection.

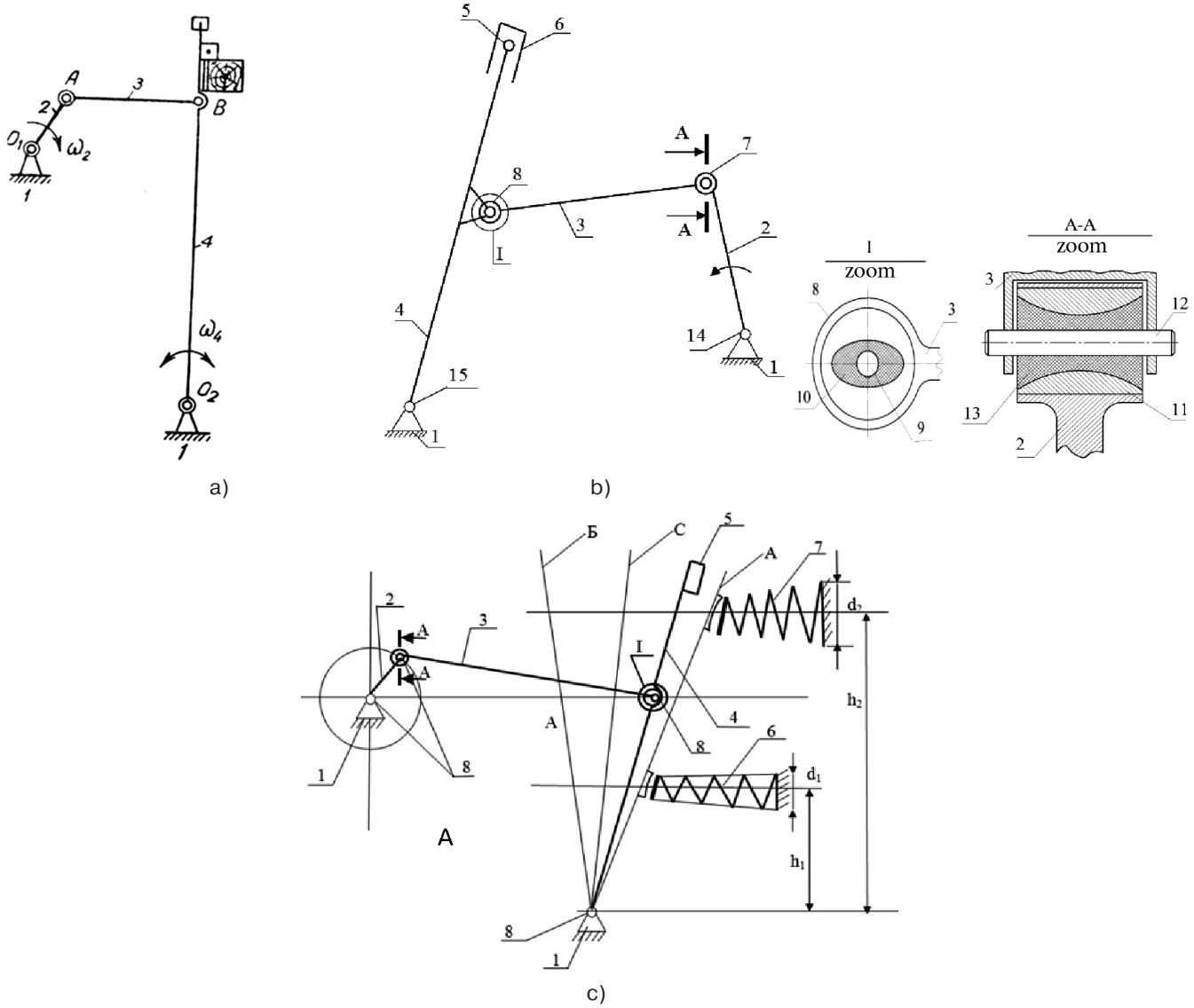

Fig.1 Scheme of the battenmechanisms of weaving looms; a – the existing mechanism of the batten; b – battenmechanism with two elastic hinges; c – battenmechanism with two elastic hinges and spring buffer redundant mechanism

The general theory of machines and mechanisms in the structural analysis part mainly detected number of mobile units, the kinematic pairs, the degree of mobility mechanism and redundant links. Determining the degree of mobility of the linkages carried out by Chebyshev, Ozola, Somov-Malyshev and Reschetov'sproposed methods [3; 4]. It also determined a redundant connection in lever mechanisms. In addition, consideration of the zero degree of mobility mechanisms are summarized in a special system, which is called the Assyrian groups [3; 4].

Battenmechanisms represent [5] planar-hinged four bar linkages. The degree of mobility of batten mechanism in Fig.1 determinedby method of Chebyshev [6].

$$W=3n-2P_5-P_4=3\cdot3-2\cdot4=1 \quad (1)$$

where, n-number of links, P4, P5 — kinematic pairs of the fourth and fifth grades.

Kinematic analysis circuit indicates that the mobility of the mechanism is one, one is a generalized coordinate. Also known [7] that, the extra degree of freedom mechanism becomes in the case of the intersection of the axes of the two pairs of the fifth grade or location of these axes parallel. Therefore, in determining the degree of mobility of the linkages with the above conditions is considered appropriate account of redundant links in the mechanism, then, according to [3; 8], we have:

$$W=6n-5P_5-4P_4+q \quad (2)$$

where, q — the number of redundant links.

Given the fact that $W=1$, $n=3$, $P_5=4$, you can define

$$q=W-6n+5P_5+4P_4=3 \quad (3)$$

The resulting number of redundant connections can also be determined using the Ozola'sformula [3].

$$q=W+6k-f=1+6\cdot1-4=3 \quad (4)$$

where, k — the number of independent loops in the mechanism, f — the total number of mobility, or the number of kinematic pairs of the fifth grade.

In the general theory of machines and mechanisms, each elastic mechanism unit available in the mobility increases by one. Effect of elastic links in the mechanisms of a certain degree of mobility does not take into account mechanisms. Thus, when using a composite rotational kinematic pairs, are not considered when determining the degree of mobility of the lever battenmechanism. It should be noted that the inclusion in the system of elastic elements reduce

It is therefore proposed a new formula for determining the degree of mobility of the lever mechanisms in view of elastic elements:

$$W = 6n–5P5 + n_y + q \quad (5)$$

wherein, n_y-elastic connections number between the components and the kinematic pairs, as well as elastic elements in composite kinematic pairs.

For lever mechanism of the batten of the weaving machine shown in Fig. 1 b, define the degree of mobility:

$$W = 3n–2P5–P4 = 1 \quad (6)$$

As can be seen from Fig. 1 b, the mechanism have one degree of freedom. Therefore, from (5) can determine the amount of redundant links.

$$q = W–6n + 5P5\text{-}n_y = 1–18 + 20–2 = 1$$

So one elastic connection reduces the number of redundant connections to the unit. Therefore, to eliminate redundant links in the lever-hinge mechanism of the loom batten Prerequisites:

$$q = ny;$$

Then, taking into account the inclusion in the mechanism of the required number of elastic elements can eliminate redundant links, q = 0.

Wherein: $W–6n + 5P5–ny = 0$ and $n_y = W–6n + 5P5$ *(7)*

For the reporting mechanism (see Fig. 1c) ny = 3.

Taking into account the proposed formulas (5) and (7) can be converted Ozola's formula [3] in the following form: $q = W + 6k–f–n_y$ where, k — the number of independent paths in the shaft couplings, for this case, $k = 1; f = 4; ny = 3; q = 0.$

Therefore, for the complete elimination of redundant links in the kinematic pairs of hinged lever battenmechanism further including spring shock absorber — energy storage between the batten and the machine housing. At the same time in contact with the rocker springs in the mechanism are no redundant links, and apart from the rocker springs redundant connections is one.

Recommended method can be used for the hinged-lever mechanisms of any complexity.

References:

1. Surina N. F., Novikov A. K. "Equipment of flax weaving industry" Publisher "Light industry" – Moscow, – 1965, – P. 273–276.
2. Fundamentals of the theory, design and calculation of textile machinery, – M., "Mechanical Engineering", – 1975, – P. 217–221.
3. Artobolevsky I. I., Theory of mechanisms and machines, "Science", – 1975.
4. Baranov G. G. Course of theory of mechanisms and machines, – M., "Mechanical Engineering", – 1975.
5. Patent Rep. of Uzb. Batten mechanism of the loom. A. Juraev, Sh. Madrakhimov, IAP 20160154.
6. Juraev A. and others. The theory of mechanisms and machines. Ed. G. Gulyama, – Tashkent, – 2004, – P. 592.
7. Akulov V. J., Determination of redundant links and mobility in the mechanisms". "Engineering", – No 4, – 1977.
8. Portgiter F. M., Application of universal joints in agricultural machinery. Se of translations, "Agricultural Engineering" – 1954.

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Motivation of the geometric form of looseners working surface of multifunction unit

Abstract: Results of the studies are brought in the article on motivation working surfaces of the geometric form of loosener multifunction unit. In the clause the results of the given researches on substantiation the geometrical form friableness working surface of the combined unit are given.

Keywords: geometric, multifunction, substantiation, friableness, cultivation, cotton plant, chisel-tillers, working organs, wedge-shape, compress, perpendicular, monolith, concave, protuberant, stretches, parameters, expenses, theoretical, experimental, contrast, velocity, fractions.

The destruction of the layer under influence working organ ground processing machines depending on their forms and parameters, depths of processing and physical-mechanical characters of ground can occur both because of the shift and take-off and a consequence of preliminary compression of ground by working organ [1, 327–328].

At present processing of ground under cultivation of cotton plant and other agricultural plants is realized by chisel-tillers and other machines with flat wedge-shaped form working organs.

As it is known [1, 328–329; 2, 44–45], when moving flat wedge-shaped form working organs (Fig. 1, *a*) ground is compressed first in perpendicular direction in planes of the wedge, but then, when appearing tension in it reaches the critical limit, the shift or take-off of the layer on planes occurs, bent to direction of the motion at an angle ψ. As a result prism-shaped clod is separated form soil monolith.

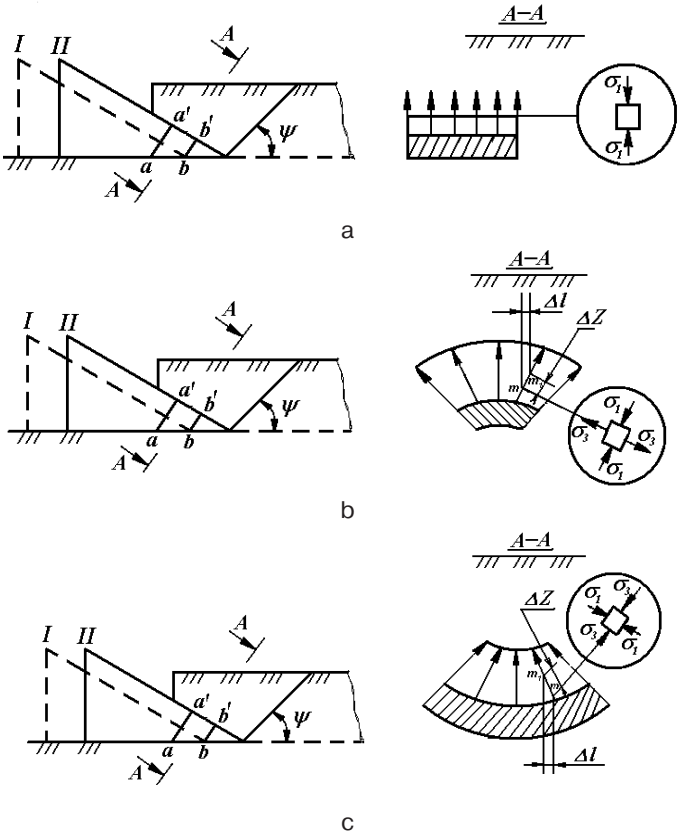

Figure 1. Deforming the ground layer under influence; a) flat, b) protuberant, c) concave

If the form of working surfaces of working organ is found in longitude-vertical plane having curvilinear type then ground layer here with decays, compresses and is under affect of other deformations.

If the form working surfaces of loosening paws is protuberant (Fig. 1, *b*), then the layer at compression in longitudinal direction sprawls, that is point m of the layer on the part of working organ is compressed at distance *z* and stretches on distance *l*. This brings to improvement of cutting ground and decreasing tractive resistance of ground.

But if the form of working surface of loosening paw is executed in concave type (Fig. 1, *v*), then layer is compressed in perpendicular and vertical directions (compressed layer for point *m* accordingly is Δz and Δl). This is because of increasing energy spending when processing the ground.

Coming from above stated for qualitative processing of ground with minimum expenses of the energy for processing of ground the form of working surface of loosening paw must be protuberant.

On the base of main researches there were made and practiced loosening paws of the form which were flat, concave and protuberant [3, 23–24].

Table 1. – Results of comparative studies of testing loosening paw with different working surfaces

Shape of the working surface of loosening paw	Working speed of the body, km/hour	Depth of tillage of ground, sm		Quality of crumbling of ground,%. size of fraction, mm			Width of loosened zone, sm		Tractive resistance of loosener, kH.	
		$M_{sr.}$	±σ	>100	100–50	>50	$M_{sr.}$	±σ	$M_{sr.}$	±σ
flat	5,0	36,2	1,08	17,47	7,40	75,13	68,4	1,35	11,46	2,46
	7,0	34,9	1,62	7,64	10,67	81,69	72,1	1,82	12,56	2,24
concave	5,0	37,7	1,21	13,50	10,10	76,40	64,5	1,28	11,63	1,98
	7,0	35,4	1,71	9,20	11,97	78,83	70,5	1,92	12,62	2,07
convex	5,0	35,7	1,19	10,20	9,85	79,84	70,9	1,53	10,41	2,23
	7,0	35,1	1,42	7,48	7,85	84,67	73,5	1,92	11,27	2,37

In researches depending on the forms working surfaces of loosening paws were studied change of quality in cutting of ground, uniformity of the depth of its processing, as well as depth of the furrow with compacted walls, width of loosened zones and tractive resistance of working organ. Herewith we changed the form of a working surface of loosening paws. The rest parameters of loosening paws were constant: at width working t surfaces of loosening paws-180 mm, angle of entering of loosener into the ground-25°, length of loosening paws – 150 mm. Studies were conducted at velocity of the moving the unit 5, 0–7, 0 km/hour with installed depth of the mov-

ing working organs-35 sm. Results of the studies are presented in the table.

Thereby, results of the studies have shown that basic researches are taken correctly. Ensuring the qualitative loosening of ground under minimum depth of the furrow with compacted wall and the least expenses of energy for loosening of ground the form of working surfaces of loosening paws must be protuberant.

As the results of theoretical researches have shown when using protuberant working surfaces of loosening paws the layer is compressed but sprawls in longitude direction. This brings about improvement of the cutting of ground and decreasing tractive resistance of the unit.

The results of carried out studies have shown that increasing the velocity of the moving the unit brings to increasing the tractive resistance of loosener and perfect the quality of cutting ground, that is fractions in size more than 100 mms decrease, but size less 50 mms increase. The main reason of this is that influence of power increases at increasing the velocity of the moving unit to inertias of ground on working organs of the machines and blow from the working organs on the ground. At increasing the velocity of the moving unit from 5,0 km/hour up to 7,0 km/hour of the tractive resistance of loosening paws with protuberant surface and working organ changed not so, much in contrast to flat and convex working units.

So on, the base of results of theoretical and experimental studies we can confirm with confidence that for qualitative processing of ground with minimum expenses of energy working organs with protuberant working surface are necessary.

References:

1. Sineokov G. N., Panov I. M. Theory and calculation ground cultivating machine. – Moscow: Machine building, – 1977.
2. Tuhtaquziev A., Hushvaktov B., Mamadaliev M. Way spare energy when processing of ground//AGRO ILM – ZH. Agriculture of Uzbekistan – T., – 2007. – No 3.
3. Khudoyorov A., Mamadaliev M. Results of the comparative test of working organ loosener//ZH. Agriculture of Uzbekistan – T., – 2008. – No 8.

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Energy consumption forecasting methodology of a set of objects

Abstract: This article presents the methodology and questions the use of different types of models for forecasting of energy consumption a set of objects. To improve the forecasting results is carried out procedure to select the best model for each object together.

Keywords: technocenosis, forecasting, data matrix, forecasting vector, forecasting models.

Introduction

One of the most important tasks of effective management of a set of objects (technocenosis [1]) is the task of energy consumption forecasting of individual objects and the whole set.

In this case, the forecasting is a procedure which consists in determining the probable values of energy consumption in the future, for planning purposes. Forecasting is designed to help decision making and planning in the present.

According to [2] forecasting can be done by different methods, which include the G-methods (based on Gaussian mathematical statistics), the Z-method (based on Zipf mathematical statistics) [3]. Also for forecasting are widely used methods based on the use of artificial neural networks [4], neuro-fuzzy models [5] and others.

The main aim of this work is to develop forecasting method and evaluate the different types of models to predict the energy consumption of a set of buildings.

Energy consumption forecasting method

The first step to perform forecasting is collection of monthly data (5 years or more) on the energy consumption of all the objects of a set, allowing you to prepare a database for further use in the calculations.

As it is known, the data which used for further analysis is not always are quite correct. There are zero data, absolutely equal data, and also so-called "outliers" resulting in incorrect database. In some cases, when there is a small volume of data need to simply increase existing database on a few years "back".

Consequently, on the second step, it requires pre-verification database that includes the following procedures: 1) elimination of zero data 2) elimination error data (outliers); 3) elimination of absolutely equal data; 4) recovery of lost data.

It should be noted that the verification procedure is not mandatory, but it must always be applied in that case there is the slightest doubt in correctness of the initial data.

Further, in the third step, performed statistical processing of data on energy consumption of buildings. The result of statistical processing is to determine the possibility of further use of the data for energy management tasks at the system level [6], in particular forecasting.

Finally, the fourth step is a forecasting. In Table 1 shows the structure of the database for forecasting task, where the monthly or annual data can be used as a database.

Table 1. – The structure of the database for forecasting task

Time Series	**The objects of a set**						
	1	2	3	3	5	n–1	n
t–5	D_{15}	D_{25}	D_{35}	D_{35}	D_{55}	$D_{(n-1)5}$	$D_{(n)5}$
t–3	D_{13}	D_{23}	D_{33}	D_{33}	D_{53}	$D_{(n-1)3}$	$D_{(n)3}$
t–3	D_{13}	D_{23}	D_{33}	D_{33}	D_{53}	$D_{(n-1)3}$	$D_{(n)3}$
t–2	D_{12}	D_{22}	D_{32}	D_{32}	D_{52}	$D_{(n-1)2}$	$D_{(n)2}$
t–1	D_{11}	D_{21}	D_{31}	D_{31}	D_{51}	$D_{(n-1)1}$	$D_{(n)1}$
…	…	…	…	…	…	…	…
t	$\mathbf{D_{10}}$	$\mathbf{D_{20}}$	$\mathbf{D_{30}}$	$\mathbf{D_{30}}$	$\mathbf{D_{50}}$	$\mathbf{D_{(n-1)0}}$	$\mathbf{D_{(n)0}}$
t+1	$D_{1\,frt}$	$D_{2\,frt}$	$D_{3\,frt}$	$D_{3\,frt}$	$D_{5\,frt}$	$D_{(n-1)\,frt}$	$D_{(n)\,frt}$

The data for the current period ($\mathbf{D_{10}}$, $\mathbf{D_{20}}$, …, $\mathbf{D_{(n-1)0}}$, $\mathbf{D_{(n)0}}$) are the "Control Vector", using which to check the accuracy of the forecasting models. The data in the next year ($D_{1\,frt}$, $D_{2\,frt}$, …, $D_{(n-1)frt}$, $D_{(n)\,frt}$) are defined as "Forecasting Vector". All other data begin from (t-5) to (t–1), form a "Matrix Data".

The forecasting process involves two interrelated stages.

In the first stage as a forecasting base uses the "Matrix Data" to which consistently are realized all forecasting models. Statistical comparison of the forecasting results with the data of "Control Vector" allows for each object to determine the most effective model. The model selection criterion is the minimum value of the relative annual error.

Then, in the second step a "Control Vector" joins the "Matrix Data" and made final forecast, with the model which defined as the most effective for this object in the first stage.

To forecasting used 12 different models:

- Model based on Decomposition of time series (DTS);
- Models based on principal component analysis of the recurrence (PCAR) and vector (PCAV) prediction;
- Model with division (WithDCZ) and without division into caste zone (WithoutDCZ);
- Model-based on linear regression (REG);
- Model based on artificial neural networks: cascade forward net (CFN) and feed forward net (FFN);
- Model based on fuzzy model type Mamdani (FMM) and Sugeno (FMS);
- Model-based on Fourier series (FS);
- Model based on the sum of Sines series (SS).

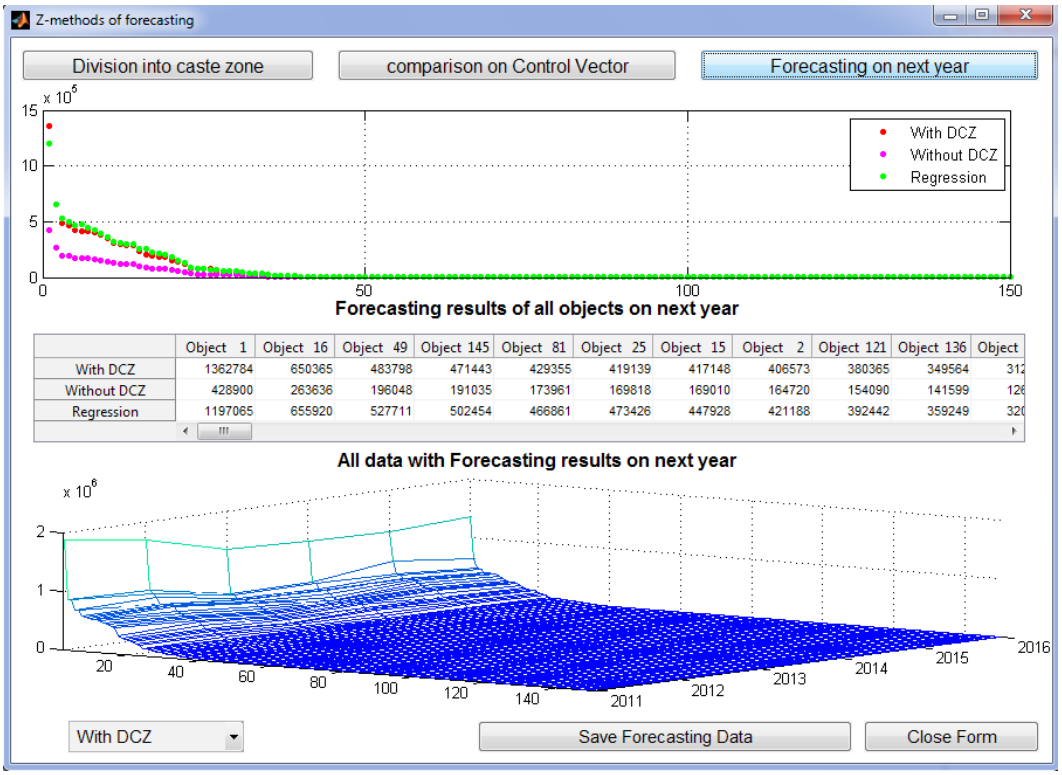

Figure1. The results of forecasting using Z-methods

The DTS Model is based on a division of random energy consumption process on deterministic, seasonal, and residual random components. The PCA Models based on converting a one-dimensional series into a multi-dimensional, study it by using principal component analysis and restoration of a series by chosen components.

The models with and without division into caste areas and REG model take into account system properties.

Models based on artificial neural networks and fuzzy logic take into account the nonlinearity of the process, and forecasting based on FS and SS very efficiently for processes with cyclical.

As an example, in Figure 1 shows the results of forecasting using Z-methods that take into account system properties [7].

The process of selecting the most effective model is performed based on the minimum value of the relative annual error in the "Control Vector". For each object, select the most appropriate forecasting model (with a minimum error value) from the considered 12 models (Figure 2). Further, according to the selected model for each object, calculates forecast values of energy consumption at the next time step.

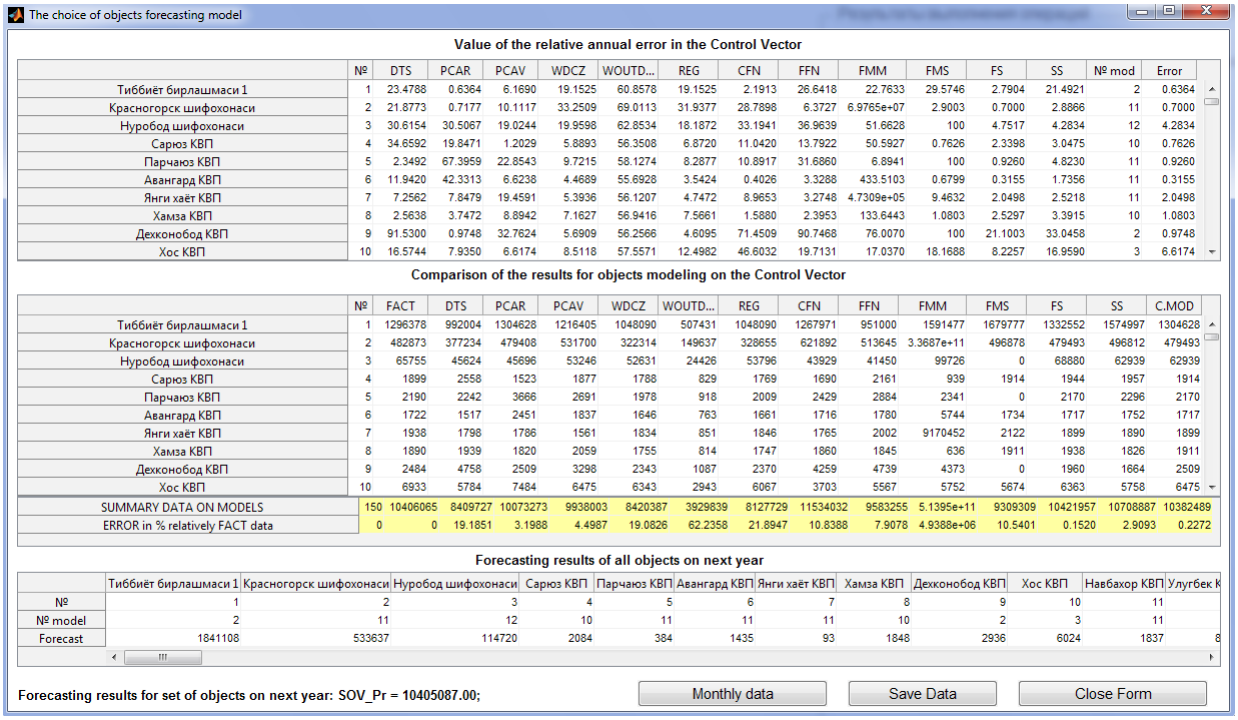

Figure 2. Select the most appropriate forecasting model for objects

Conclusion

The results of the use this methodology for a set of social facilities showed that this approach can improve the quality of forecasting of energy consumption for the entire set of objects and individual objects together, in relation to the case of the use of one specific approach. Error forecasting for a set of objects was 0.22%, and the maximum value for the objects of error does not exceed 5–6%.

References:

1. Gnatyuk V. I. Law of optimum construction technocenosis: Monography – 2 nd ed., revised. and ext. – Kaliningrad, – 2014. – 475 p.
2. Chuchueva I. A. Model prediction of time series based on a sample of maximum similarity. – Moscow, – 2012 g. – URL: http: www.mbureau.ru/articles
3. Gnatyuk V. I. GZ-rank analysis of parametric distribution electricity needs. – Kaliningrad, – 2010. – URL: http: www.gnatukvi.ru
4. Krug P. G. Neural networks and neurocomputers. Chapter 1.5. Forecasting. – Moscow – 2002 g. – URL: http://lib.tuit.uz
5. Shtovba S. D. Design of fuzzy systems MATLAB tools. – M. – 2007. – 288 p.
6. Salikhov T. P., Khudayarov M. B. Methodology for building energy consumption management of social facilities. Magazine " Energu security and energy efficiency", – Moscow, – No 3, – 2015, – P. 16–21.
7. Salikhov T. P., Khudayarov M. B. The complex of programs for energy management of buildings. Certificate DGU 02932 from 12.26.2014. Agency on Intellectual Property of the Republic of Uzbekistan, Tashkent.

Contents